# **EXHIBIT C**



2800 Jefferson Street Napa, California 94558 707-253-1806 www.ppiengineering.com

## **MEMORANDUM**

Date:

July 11, 2018

To:

Patrick Ryan, Napa County Planning, Building and Environmental Services

From:

James R. Bushey, P.E.

Cody J. Corsetti, P.E.

Cc:

Brian Bordona, Napa County Planning, Building and Environmental Services

Re:

Metamorphosis Wines LLC

Ovid Vineyards Track I ECP APNs 032-030-065 & -066

Hydrologic Analysis

This memo transmits the findings of a hydrologic analysis for the above-referenced Track I Erosion Control Plan (ECP). HydroCAD software was used to estimate pre- and post-project runoff from watersheds containing the proposed development areas. The software uses the Natural Resource Conservation Service (NRCS) TR-20 method to calculate runoff. The analysis uses the Type IA 24-hr storm distribution and includes site-specific National Oceanic and Atmospheric Administration (NOAA) point precipitation data for the ranch.

Four (4) watersheds were delineated for the hydrologic modeling. Watershed 1 flows to an existing sediment basin that is located on the adjacent parcel. The northwest section of this watershed boundary is defined by an existing roadside ditch. Watershed 2 flows to an unnamed blue-line stream that eventually flows to Lake Hennessey. Watershed 3 flows to an unnamed blue-line stream that flows into Conn Creek further downstream. Watershed 4 flows to an ephemeral stream which in turn flows to the same blue-line stream that Watershed 3 flows into. Consequently, Watersheds 3 & 4 were analyzed both individually (at the watershed level) and jointly (at the common outlet along the blue-line stream). Please see the attached figures for the location of each watershed.

Soils within the watersheds were obtained from the NRCS Web Soil Survey and are classified as the following:

Boomer Loam, 2-35% Slopes (Map Unit Symbol 107) Boomer Gravelly Loam, 14-60% Slopes (Map Unit Symbol 109) Hambright Rock-Outcrop Complex, 30-75% Slopes (Map Unit Symbol 152) Rock Outcrop-Hambright Complex, 50-75% Slopes (Map Unit Symbol 176) Sobrante Loam, 5-30% Slopes (Map Unit Symbol 178)

The Boomer Loam, Boomer Gravelly Loam and Sobrante Loam are classified as Hydrologic Soil Group (HSG) C. The Hambright Rock-Outcrop Complex and Rock Outcrop-Hambright Complex are classified as HSG D. Please see the attached figures for soil type delineations within the vicinity of each watershed.

Land use areas were initially delineated based on Napa County Orthophotos and both American Aerial Mapping and Napa County Contours. A site visit was then conducted on January 16, 2018 by Matt Bueno of PPI Engineering to ground truth the orthophotos and determine the existing land use conditions. The land use hydrologic conditions were classified based on the respective covers as poor (less than 50% cover), fair (50%-75% cover) or good (greater than or equal to 75% cover). The HydroCAD software analyzes the land use data along with the corresponding soil HSGs to determine a weighted Curve Number (CN) for runoff calculations. Please see the attached figures for existing and proposed land use delineations.

The Time of Concentration (Tc) flow path within each watershed was determined using both American Aerial Mapping and Napa County Contours. The flow path in each watershed was drafted from the hydrologically most distant point (longest travel time) in the watershed to the watershed outlet per NRCS standards. For Watersheds 1, 2 & 4 the Tc did not change from preto post-project conditions. The Tc flow path in each of these watersheds did not flow through any proposed drainage/erosion control elements when analyzed under post-project conditions. For Watershed 3 the proposed rock filled avenue/level spreader on the downhill side of proposed Block 2C resulted in Tc changes post-project. Please see the attached figures for both the preand post-project Tc flow paths by watershed.

As discussed above, Watersheds 3 & 4 were also analyzed jointly due to the fact that they are hydrologically connected. A single reach (Reach 1) was routed from the outlet of Watershed 4 to the common outlet point of Watershed 3. This reach did not change from pre- to post-project conditions. Please see the attached figures for the location of this single reach.

Pre- and post-project runoff calculations from the HydroCAD models for each individual watershed are summarized in Table 1 below. Runoff was calculated for the 2-, 10-, 50- and 100-year storms respectively for each watershed.

11712801 2 of 4

**Table 1.** Individual Watershed Summary

Tuble II IIIa	1114441	riddar Watershed Summary										
		Runoff (cfs)										
	Wa	atershe	d 1	Watershed 2			Watershed 3			Watershed 4		
	Pre- Project	Post- Project	Increase/ Decrease	Pre- Project	Post- Project	Increase/ Decrease	Pre- Project	Post- Project	Increase/ Decrease	Pre- Project	Post- Project	Increase/ Decrease
2-Year	27.25	27.25	0.00	25.24	25.24	0.00	37.37	35.18	2.19	26.34	26.34	0.00
Storm	27.25	27.25	0.00	20.2	23.24	0.00	37.37	33.10	2.13	20.54	20.54	0.00
10-Year	51.37	51.37 51.37	0.00	51.23	51.23	0.00	77.78	73.67	4.11	52.31	52.31	0.00
Storm	31.37	31.37	0.00	31.23	31.23	0.00	77.70	75.07	7.11	32.31	32.31	
50-Year	77.08	77.08	0.00	79.85	79.85	0.00	122 33	116.54	5.79	80.75	80.75	0.00
Storm		,,.00	0.00	, 5.05	, 5.05	0.00	122.33	110.54		55.75	00.75	0.00
100-Year	88.01	88.01	0.00	92.18	92.18	0.00	141 69	135.10	6.59	92.97	92.97	0.00
Storm	00.01	00.01	0.00	52.10	52.10	0.00	1-1.05	133.10	0.55	92.97	32.37	0.00

With regards to the joint analysis of Waterheeds 3 & 4, the respective inflows and outflows of Reach 1 are presented in Table 2 below for pre- and post-project conditions. Additionally, the calculated runoff at the common outlet point of both watersheds is presented in Table 3 below (again for both pre- and post-project conditions).

 Table 2. Reach Summary

		•	Runof	ff (cfs)			
	Rea	ach 1 Infl	ow	Reach 1 Outflow			
	Pre- Project	Post- Project	Increase/ Decrease	Pre- Project	Post- Project	Increase/ Decrease	
2-Year Storm	26.34	26.34	0.00	25.76	25.76	0.00	
10-Year Storm	52.31	52.31	0.00	51.72	51.72	0.00	
50-Year Storm	80.75	80.75	0.00	80.20	80.20	0.00	
100-Year Storm	92.97	92.97	0.00	92.44	92.44	0.00	

11712801 3 of 4

**Table 3.** Watershed 3 & 4 Outlet Summary

	Runoff (cfs)									
	Watershed 3 & 4 Outlet									
	Pre- Project	Post- Project	Increase / Decrease							
2-Year Storm	62.14	60.91	1.23							
10-Year Storm	128.31	125.39	2.92							
50-Year Storm	201.53 196.72		4.81							
100-Year Storm	233.13	227.50	5.63							

At the individual watershed level, Watersheds 1, 2 & 4 show no net change in runoff from pre- to post-project conditions. This is due to the fact that neither the curve number (CN) nor the time of concentration (Tc) in these respective watersheds changed for post-project analysis. Watershed 3 shows a reduction in runoff for all storm events analyzed. The CN did not change for Watershed 3, but the Tc almost doubled for post-project conditions. This Tc increase caused the overall runoff decreases post-project.

The model shows no runoff changes in the reach connecting Watershed 4 to the Watershed 3 outlet. The runoff in this reach did not change due to the fact that calculated runoff in Watershed 4 did not change from pre- to post-project conditions. Additionally, the analyzed outlet point for both Watersheds 3 & 4 shows a post-project decrease in runoff for all storm events analyzed. These decreases can be attributed to the overall runoff decreases calculated in the individual Watershed 3 analysis.

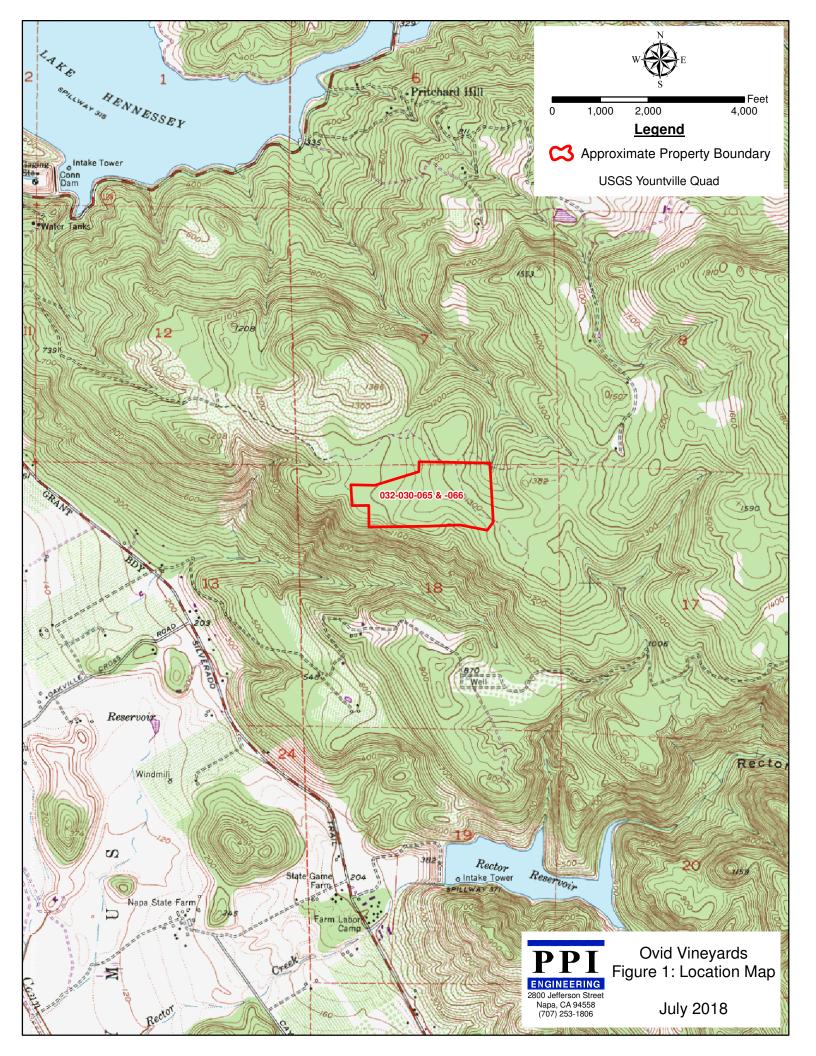
Please see the attached HydroCAD analyses for inputs, details and summaries of the hydrologic modeling. Based on our analysis, there are no predicted net runoff increases and no negative hydrologic impacts are expected as a result of this project. The project as proposed is in compliance with Napa County's General Plan policy requiring no net increase in runoff.

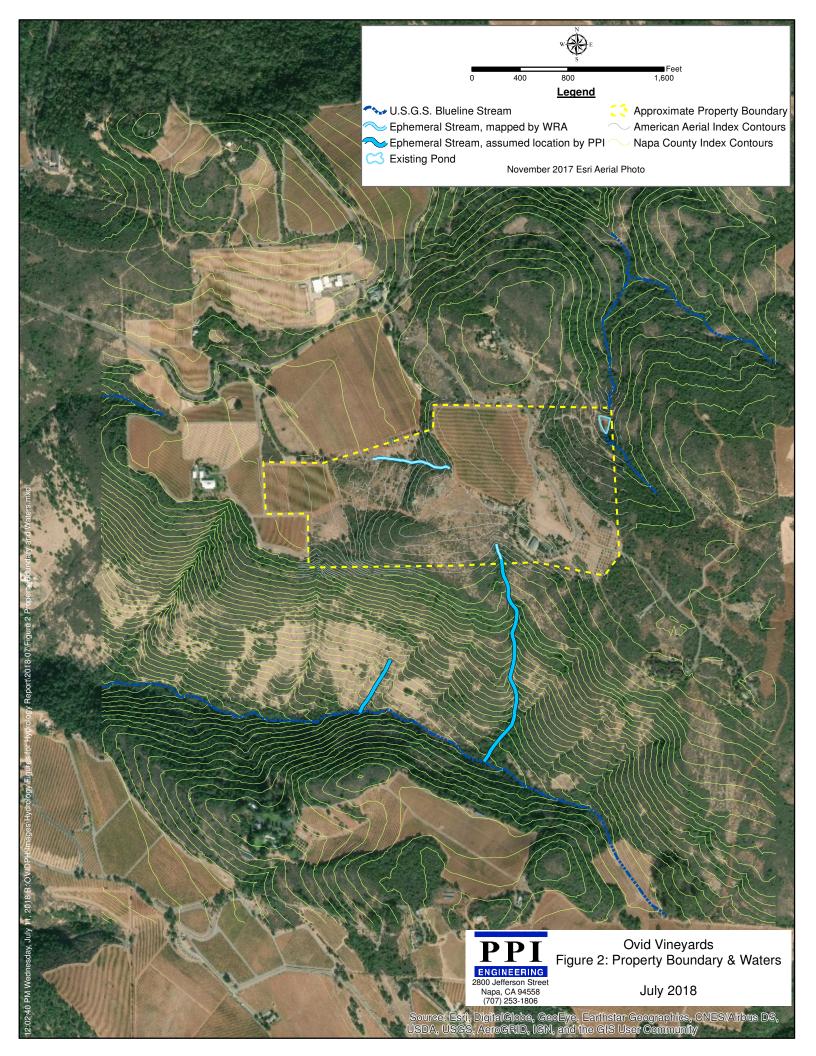


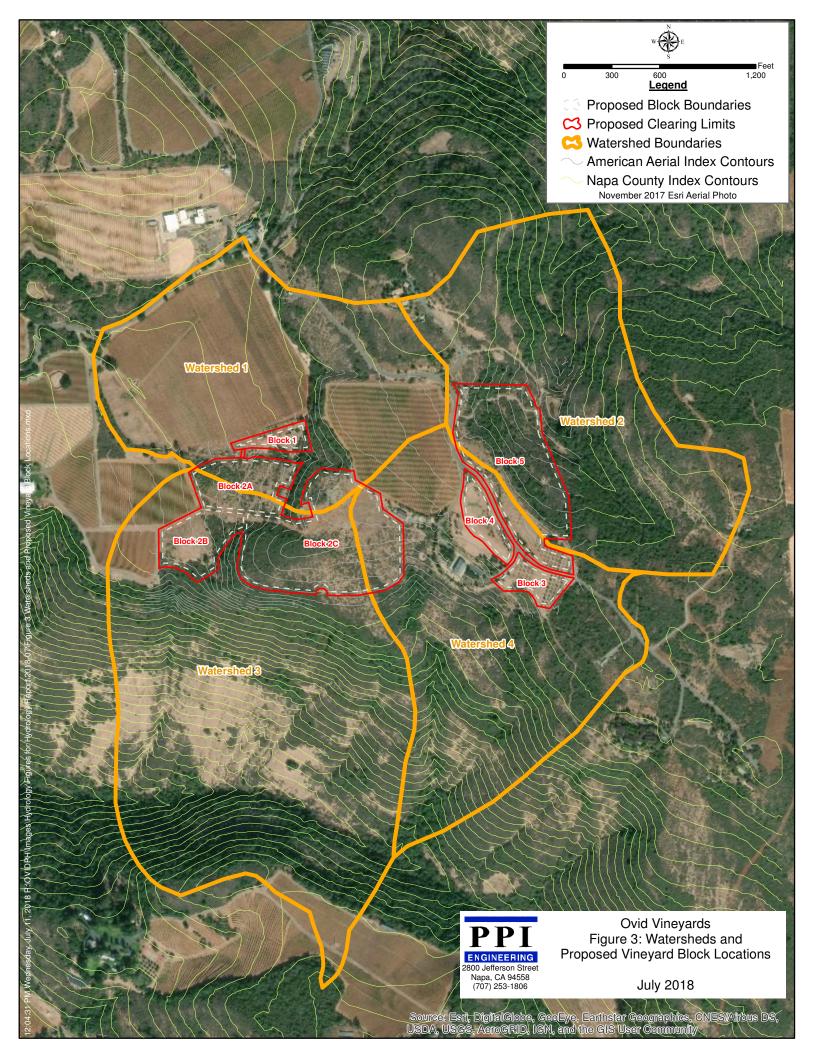
11712801 4 of 4

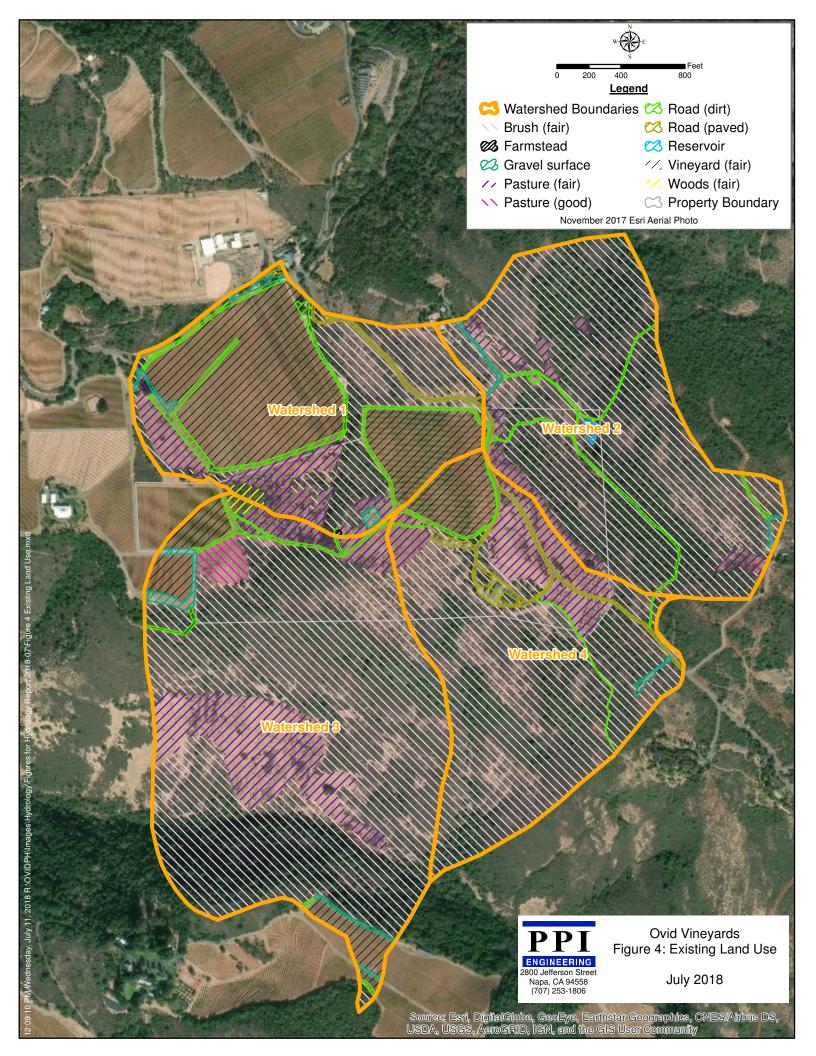
# ATTACHMENT A

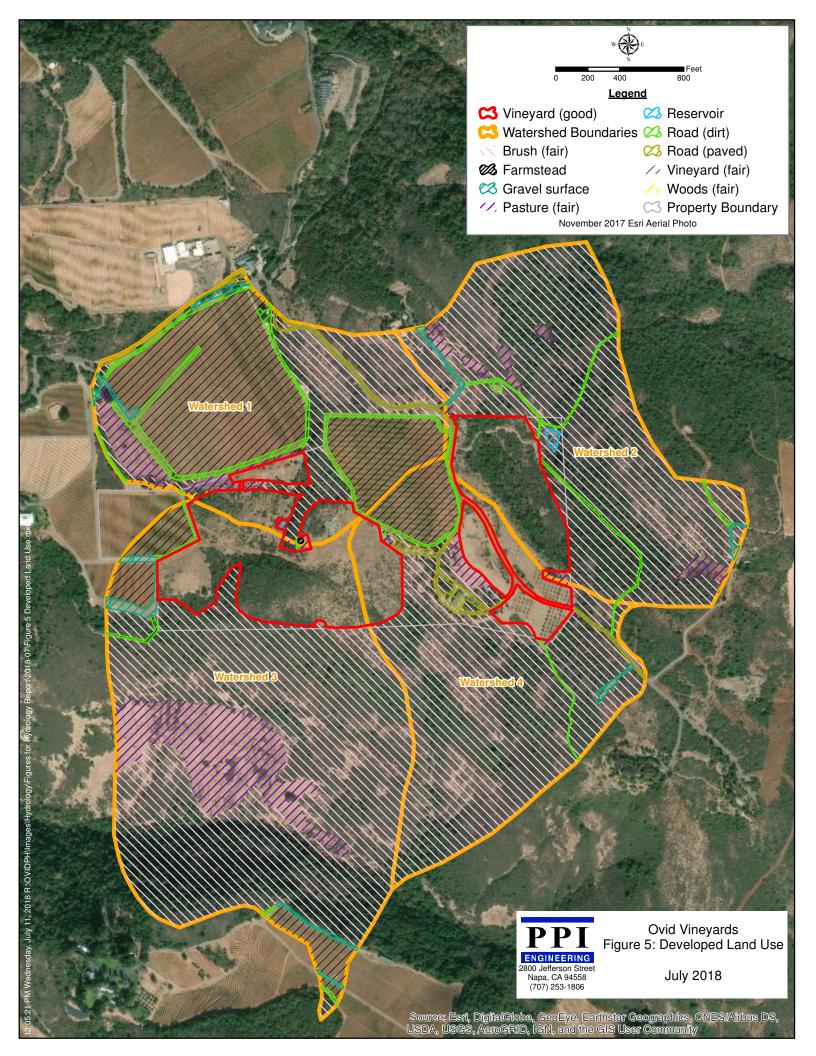
SUPPORTING FIGURES

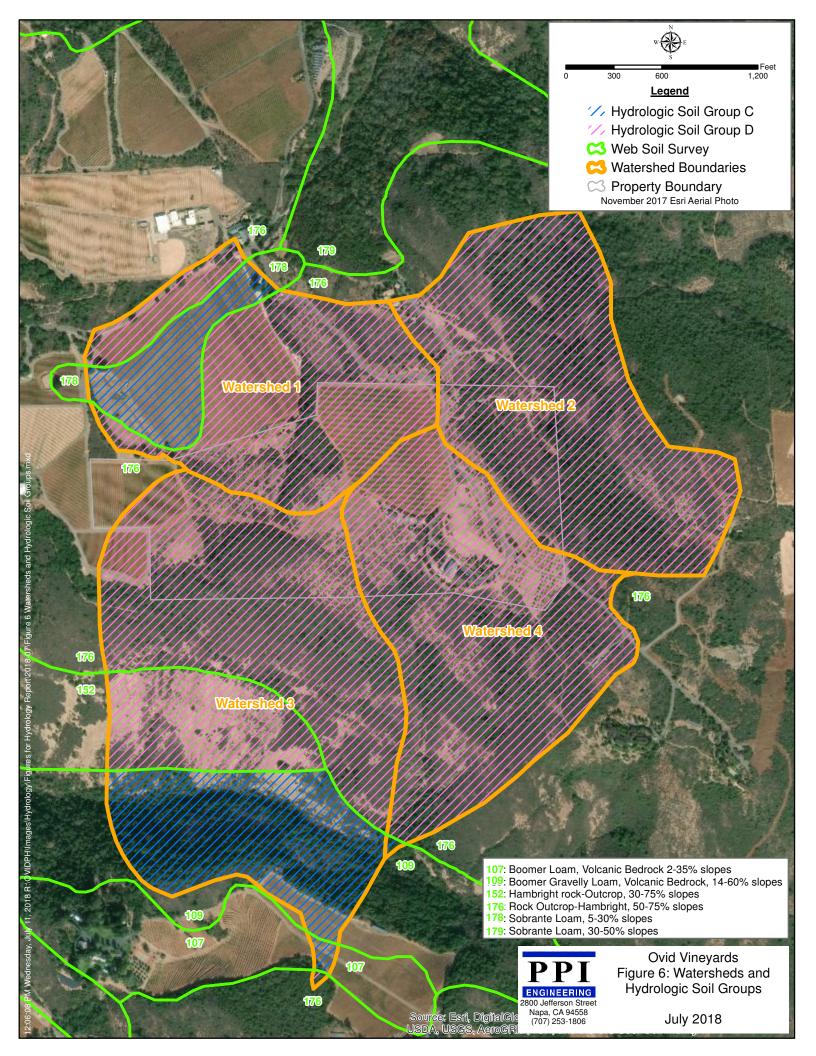


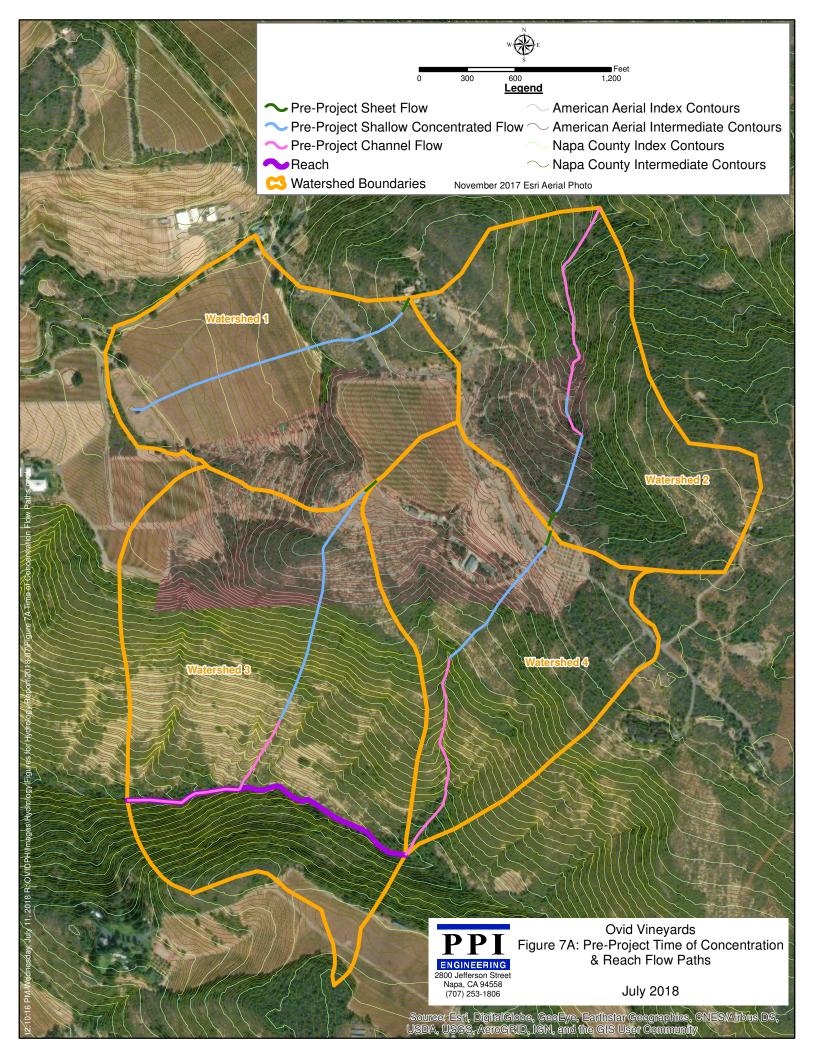


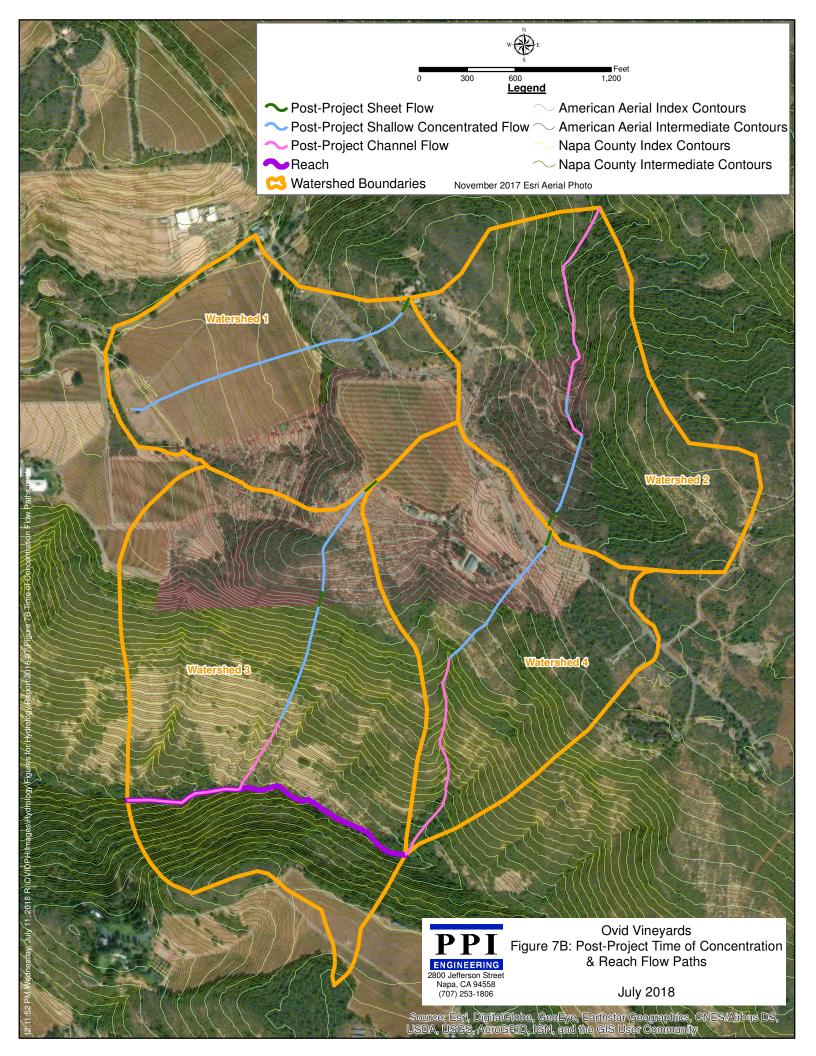






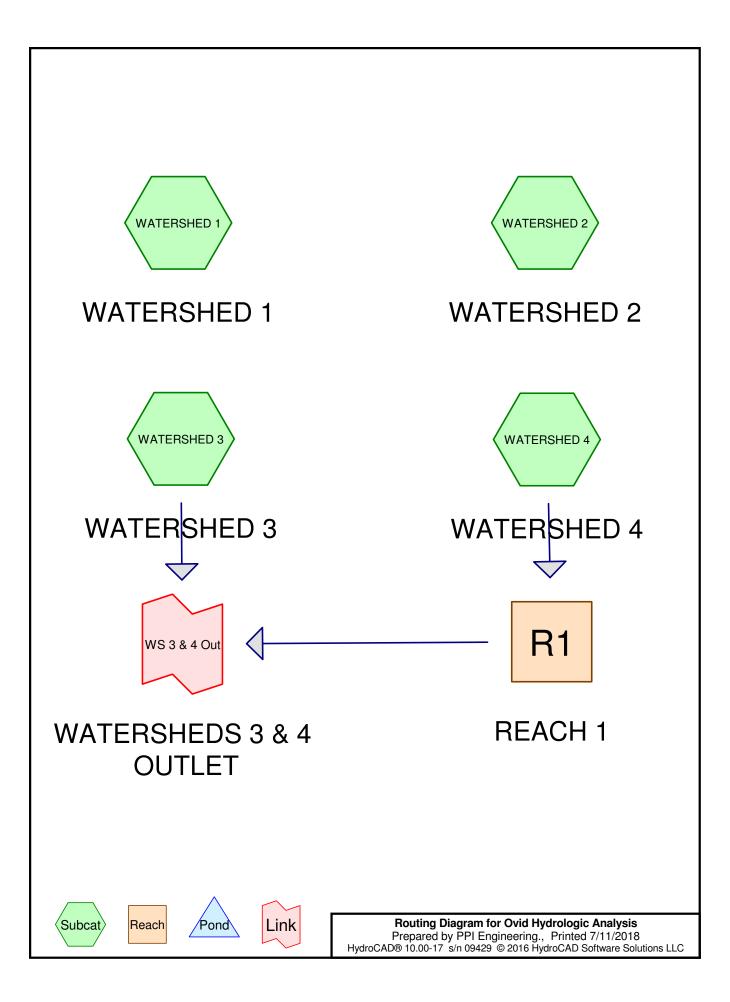






# ATTACHMENT B

**HYDROCAD ANALYSES** 

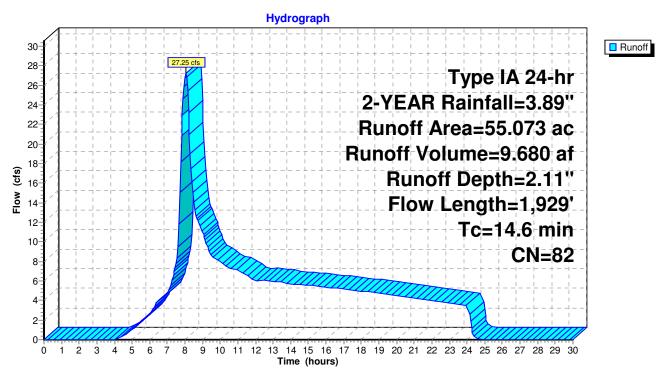


# **Summary for Subcatchment WATERSHED 1: WATERSHED 1**

Runoff 27.25 cfs @ 8.05 hrs, Volume= 9.680 af, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 2-YEAR Rainfall=3.89"

Area	(ac)	CN	Desc	cription								
* 0.	000	0	, HS	G D								
0.	318	70	Brus	h, Fair, HS								
14.	481	77	Brus	Brush, Fair, HSG D								
1.	236	87	Dirt r	roads, HS0	G C							
2.	.001	89		roads, HS0								
_	022	86		nsteads, H								
	154	96		el surface	•							
	644	96		el surface	•							
	464	79				Fair, HSG C						
	693	84				Fair, HSG D						
	044	92		Paved roads w/open ditches, 50% imp, HSG C								
	1.464 93			Paved roads w/open ditches, 50% imp, HSG D								
	8.357 79			yard, Fair,								
	767	84		Vineyard, Fair, HSG D								
	429	79		Woods, Fair, HSG D								
	.073	82		Weighted Average								
	319			98.63% Pervious Area								
0.	754		1.37	1.37% Impervious Area								
_			٠.									
Tc	Lengt		Slope	Velocity	Capacity	Description						
(min)	(fee		(ft/ft)	(ft/sec)	(cfs)							
8.5	6	6 0	.0700	0.13		Sheet Flow, SHEET						
						Woods: Light underbrush n= 0.400 P2= 3.89"						
6.1	1,86	3 0	.1000	5.09		Shallow Concentrated Flow, SHALLOW						
						Unpaved Kv= 16.1 fps						
14.6	1,92	9 T	otal									

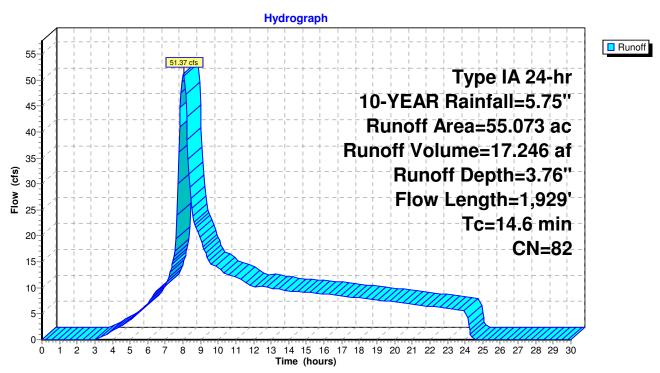


# **Summary for Subcatchment WATERSHED 1: WATERSHED 1**

Runoff = 51.37 cfs @ 8.04 hrs, Volume= 17.246 af, Depth= 3.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 10-YEAR Rainfall=5.75"

	Area (	ac)	CN	Desc	cription									
*	0.0	000	0	, HS	G D									
	0.3	318	70	Brus	h, Fair, HS	SG C								
	14.4	<del>1</del> 81	77	Brus	h, Fair, HS									
	1.2	236	87	Dirt r	rt roads, HSG C									
	2.0	001	89		irt roads, HSG D									
		)22	86		nsteads, H									
		154	96		el surface	•								
		644	96		el surface	,								
		164	79				Fair, HSG C							
		393	84				Fair, HSG D							
	0.044 92 Paved roads w/open ditches, 50% imp, HSG C													
	1.464 93 Paved roads w/open ditches, 50% imp, HSG D													
		357	79		Vineyard, Fair, HSG C									
	18.7		84		yard <u>,</u> Fair,									
		129	79		Woods, Fair, HSG D									
	55.0		82		Weighted Average									
	54.3	_			98.63% Pervious Area									
	0.7	754		1.37	% Impervi	ous Area								
	_	_												
	Tc	Lengi		Slope	Velocity	Capacity	Description							
	(min)	(fee		(ft/ft)	(ft/sec)	(cfs)								
	8.5	6	6 (	0.0700	0.13		Sheet Flow, SHEET							
							Woods: Light underbrush n= 0.400 P2= 3.89"							
	6.1	1,86	3 (	0.1000	5.09		Shallow Concentrated Flow, SHALLOW							
_							Unpaved Kv= 16.1 fps							
	14.6	1,92	9 -	Total										

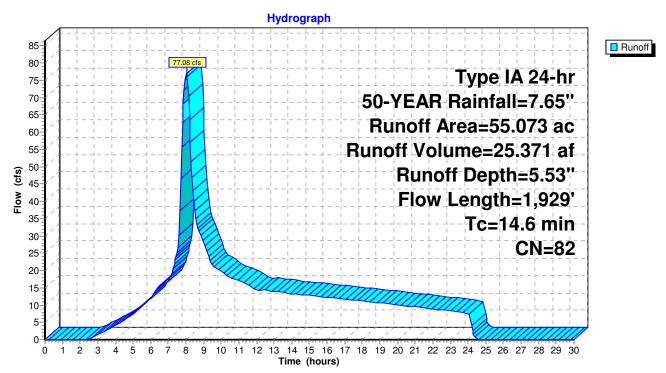


# **Summary for Subcatchment WATERSHED 1: WATERSHED 1**

Runoff = 77.08 cfs @ 8.03 hrs, Volume= 25.371 af, Depth= 5.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 50-YEAR Rainfall=7.65"

	Area	(ac)	C١	J Desc	cription						
*		000	<u> </u>								
		318	70	,	h, Fair, HS	SG C					
		481	77		h, Fair, HS						
		236	87		roads, HS						
		001	89		roads, HS						
		022	86		nsteads, H						
	0.	154	96		el surface						
	0.	644	96		el surface	•					
	1.	464	79	Past	ure/grassl	and/range,	Fair, HSG C				
	5.	693	84				Fair, HSG D				
	0.	044	92	nes, 50% imp, HSG C							
1.464 93 Paved roads w/open ditches, 50% imp, HSG I							nes, 50% imp, HSG D				
	8.357 79				yard, Fair,						
	_	767	84		Vineyard, Fair, HSG D						
_		429	79		Woods, Fair, HSG D						
		073	82		Weighted Average						
		319			3% Pervio						
	0.	754		1.37	% Impervi	ous Area					
	_			01							
	Tc	Leng		Slope	Velocity	Capacity	Description				
_	(min)	(fee		(ft/ft)	(ft/sec)	(cfs)					
	8.5	(	66	0.0700	0.13		Sheet Flow, SHEET				
							Woods: Light underbrush n= 0.400 P2= 3.89"				
	6.1	1,86	53	0.1000	5.09		Shallow Concentrated Flow, SHALLOW				
_							Unpaved Kv= 16.1 fps				
	14.6	1,92	29	Total							

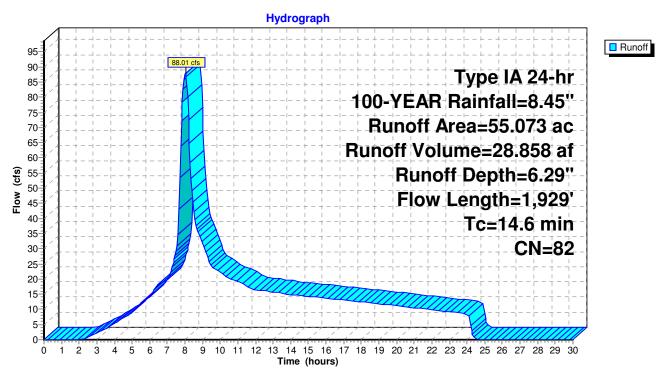


# **Summary for Subcatchment WATERSHED 1: WATERSHED 1**

Runoff = 88.01 cfs @ 8.03 hrs, Volume= 28.858 af, Depth= 6.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 100-YEAR Rainfall=8.45"

Area	(ac)	CN	l Desc	cription								
* 0	.000	0	, HS	G D								
0.	.318	70	Brus	h, Fair, HS	SG C							
14.	.481	77	' Brus	rush, Fair, HSG D								
1.	.236	87	' Dirt ı	roads, HS0	G C							
2	.001	89	Dirt ı	roads, HS0	G D							
0.	.022	86	Farm	nsteads, H	SG D							
0.	.154	96	Grav	el surface	, HSG C							
0	.644	96		el surface								
	.464	79				Fair, HSG C						
	.693	84				Fair, HSG D						
_	0.044 92 Paved roads w/open ditches, 50% imp, HSG C											
						nes, 50% imp, HSG D						
	8.357 79			yard, Fair,								
	.767	84		Vineyard, Fair, HSG D								
0	.429	79	) Woo	Woods, Fair, HSG D								
	.073	82		Weighted Average								
	.319		98.6	3% Pervio	us Area							
0.	.754		1.37	% Impervi	ous Area							
Tc	Leng		Slope	Velocity	Capacity	Description						
(min)	(fee	et)	(ft/ft)	(ft/sec)	(cfs)							
8.5	(	66	0.0700	0.13		Sheet Flow, SHEET						
						Woods: Light underbrush n= 0.400 P2= 3.89"						
6.1	1,86	63	0.1000	5.09		Shallow Concentrated Flow, SHALLOW						
						Unpaved Kv= 16.1 fps						
14.6	1,92	29	Total									

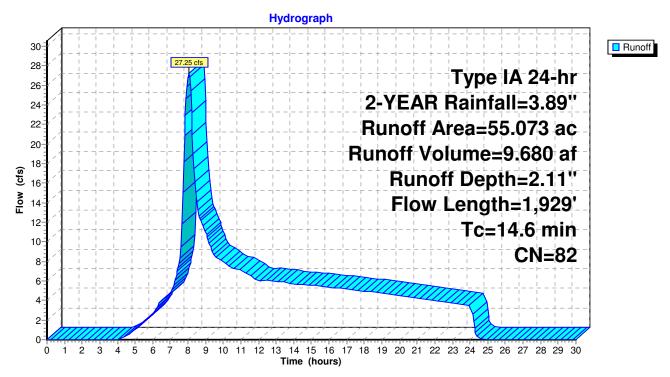


# **Summary for Subcatchment WATERSHED 1: WATERSHED 1**

Runoff = 27.25 cfs @ 8.05 hrs, Volume= 9.680 af, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 2-YEAR Rainfall=3.89"

Area	(ac)	CN	Desc	cription						
* 0	.000	0	, HS	G D						
0.	.318	70	Brus	h, Fair, HS	SG C					
13.	.242	77	Brus	h, Fair, HS	SG D					
1.	.236	87	Dirt r	roads, HS0	G C					
	.949	89		oads, HS0						
0.	.022	86		nsteads, H						
0.	.154	96	Grav	el surface	, HSG C					
0.	.402	96		el surface	•					
	.464	79				Fair, HSG C				
	.191	84				Fair, HSG D				
	.044	92				es, 50% imp, HSG C				
	.464	93				es, 50% imp, HSG D				
8.357 79 Vineyard, Fair, HSG C										
	.767	84		yard, Fair,						
	.375	81		Vineyard, Good, HSG D						
	.087	79		Woods, Fair, HSG D						
	.073	82		Weighted Average						
	.319			3% Pervio						
0.	.754		1.37	% Impervi	ous Area					
_			<b>.</b> .			<b>D</b> 1.0				
Tc	Lengt		Slope	Velocity	Capacity	Description				
<u>(min)</u>	(fee		(ft/ft)	(ft/sec)	(cfs)					
8.5	6	6 0.	0700	0.13		Sheet Flow, SHEET				
						Woods: Light underbrush n= 0.400 P2= 3.89"				
6.1	1,86	3 0.	1000	5.09		Shallow Concentrated Flow, SHALLOW				
						Unpaved Kv= 16.1 fps				
14.6	1,92	9 To	otal							



## **Ovid Post-Project**

Prepared by PPI Engineering.

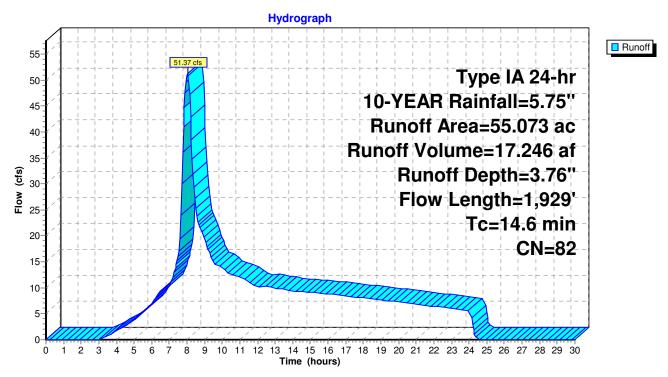
HydroCAD® 10.00-17 s/n 09429 © 2016 HydroCAD Software Solutions LLC

# **Summary for Subcatchment WATERSHED 1: WATERSHED 1**

Runoff = 51.37 cfs @ 8.04 hrs, Volume= 17.246 af, Depth= 3.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 10-YEAR Rainfall=5.75"

	Area (	ac) (	CN	Desc	cription									
*		000	0	, HS										
			70	,	h, Fair, HS	SG C								
	13.2	242	77	Brus	rush, Fair, HSG D									
	1.2	236	87	Dirt r	rt roads, HSG C									
	1.9	949	89	Dirt r	oads, HS0	G D								
	0.0	)22	86	Farm	nsteads, H	SG D								
	0.1	54	96	Grav	el surface	, HSG C								
	0.4	102	96	Grav	el surface	, HSG D								
	1.4	164	79	Past	ure/grassla	and/range,	Fair, HSG C							
	2.1	91	84				Fair, HSG D							
			92				es, 50% imp, HSG C							
			93			•	es, 50% imp, HSG D							
		357	79		yard, Fair,									
	18.7		84		yard, Fair,									
			81	Vineyard, Good, HSG D										
_	0.0	)87	79	Woods, Fair, HSG D										
	55.0	)73	82	Weig	ghted Aver	age								
	54.3	319		98.6	3% Pervio	us Area								
	0.7	754		1.37	% Impervi	ous Area								
		Length		lope	Velocity	Capacity	Description							
_	(min)	(feet)	(	ft/ft)	(ft/sec)	(cfs)								
	8.5	66	0.0	700	0.13		Sheet Flow, SHEET							
							Woods: Light underbrush n= 0.400 P2= 3.89"							
	6.1	1,863	0.1	000	5.09		Shallow Concentrated Flow, SHALLOW							
_							Unpaved Kv= 16.1 fps							
	14.6	1,929	To	tal										



## **Ovid Post-Project**

Prepared by PPI Engineering.

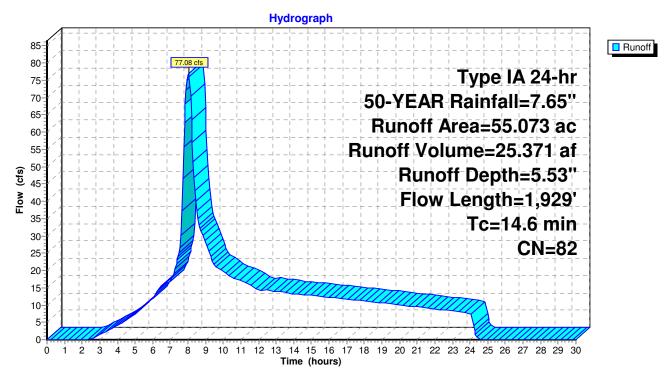
HydroCAD® 10.00-17 s/n 09429 © 2016 HydroCAD Software Solutions LLC

# **Summary for Subcatchment WATERSHED 1: WATERSHED 1**

Runoff = 77.08 cfs @ 8.03 hrs, Volume= 25.371 af, Depth= 5.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 50-YEAR Rainfall=7.65"

Area	(ac)	CN	Desc	cription									
* 0.	000	0	, HS	G D									
0.	318	70	Brus	h, Fair, HS	SG C								
13.	242	77	Brus	ush, Fair, HSG D									
1.	236	87	Dirt r	roads, HS0	ЭC								
1.	949	89	Dirt r	roads, HS0	G D								
0.	022	86	Farm	nsteads, H	SG D								
0.	154	96	Grav	el surface	, HSG C								
0.	402	96	Grav	el surface	, HSG D								
1.	464	79	Past	ure/grassla	and/range,	Fair, HSG C							
2.	191	84	Past	ure/grassla	and/range,	Fair, HSG D							
0.	044	92	Pave	Paved roads w/open ditches, 50% imp, HSG C									
1.	464	93	Pave	ed roads w	nes, 50% imp, HSG D								
8.	357	79 Vineyard, Fair, HSG C											
_	767	84		yard, Fair,									
	375	81		Vineyard, Good, HSG D									
0.	.087	79	Woo	Woods, Fair, HSG D									
55.	073	82	Weig	ghted Aver	age								
54.	319		98.6	3% Pervio	us Area								
0.	754		1.37	% Impervi	ous Area								
Tc	Lengt		Slope	Velocity	Capacity	Description							
(min)	(fee	t)	(ft/ft)	(ft/sec)	(cfs)								
8.5	6	66	0.0700	0.13		Sheet Flow, SHEET							
						Woods: Light underbrush n= 0.400 P2= 3.89"							
6.1	1,86	3	0.1000	5.09		Shallow Concentrated Flow, SHALLOW							
						Unpaved Kv= 16.1 fps							
14.6	1,92	29	Total										

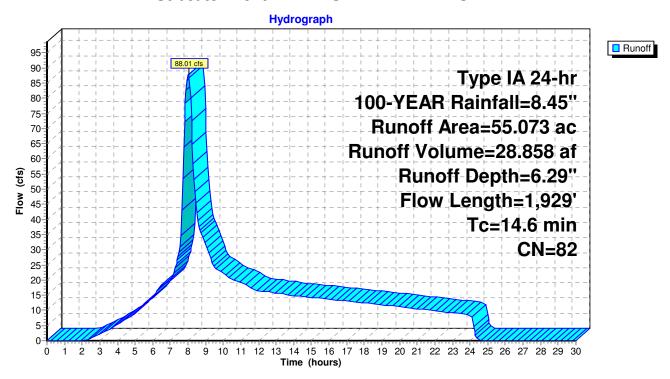


# **Summary for Subcatchment WATERSHED 1: WATERSHED 1**

Runoff = 88.01 cfs @ 8.03 hrs, Volume= 28.858 af, Depth= 6.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 100-YEAR Rainfall=8.45"

Area	(ac)	CN	Desc	cription						
* 0	.000	0	, HS	G D						
0.	.318	70	Brus	h, Fair, HS	SG C					
13.	.242	77	Brus	h, Fair, HS	SG D					
1.	.236	87	Dirt r	roads, HS0	G C					
	.949	89		oads, HS0						
0.	.022	86		nsteads, H						
0.	.154	96	Grav	el surface	, HSG C					
0.	.402	96		el surface	•					
	.464	79				Fair, HSG C				
	.191	84				Fair, HSG D				
	.044	92				es, 50% imp, HSG C				
	.464	93				es, 50% imp, HSG D				
8.357 79 Vineyard, Fair, HSG C										
	.767	84		yard, Fair,						
	.375	81		Vineyard, Good, HSG D						
	.087	79		Woods, Fair, HSG D						
	.073	82		Weighted Average						
	.319			3% Pervio						
0.	.754		1.37	% Impervi	ous Area					
_			<b>.</b> .			<b>D</b> 1.0				
Tc	Lengt		Slope	Velocity	Capacity	Description				
<u>(min)</u>	(fee		(ft/ft)	(ft/sec)	(cfs)					
8.5	6	6 0.	0700	0.13		Sheet Flow, SHEET				
						Woods: Light underbrush n= 0.400 P2= 3.89"				
6.1	1,86	3 0.	1000	5.09		Shallow Concentrated Flow, SHALLOW				
						Unpaved Kv= 16.1 fps				
14.6	1,92	9 To	otal							

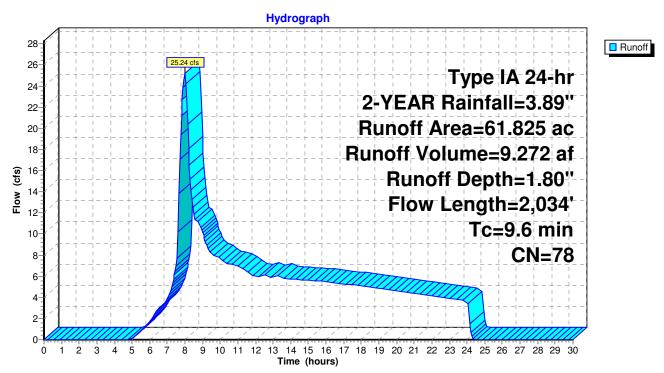


# **Summary for Subcatchment WATERSHED 2: WATERSHED 2**

Runoff = 25.24 cfs @ 8.02 hrs, Volume= 9.272 af, Depth= 1.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 2-YEAR Rainfall=3.89"

	Area	(ac) (	ON Des	cription					
*	0.	000	0 , HS	G D					
	55.	311	77 Brus	sh, Fair, HS	SG D				
	1.	217	89 Dirt	roads, HS0	G D				
	0.406 96			el surface					
						Fair, HSG D			
				Paved roads w/open ditches, 50% imp, HSG D					
				yard, Fair,					
_				<u>er Surface</u> ghted Aver	,				
	61.								
	61.548			5% Pervio					
	0.	277	0.45	% Impervi	ous Area				
	т.	مالسميما	Clana	Valaaitu	Conneitu	Description			
	Tc (min)	Length		Velocity	Capacity	Description			
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	Chart Flow OUEFT			
	5.5	100	0.1700	0.30		Sheet Flow, SHEET			
	1.6	E00	0.1100	E 24		Grass: Dense n= 0.240 P2= 3.89"			
	1.6	508	0.1100	5.34		Shallow Concentrated Flow, SHALLOW Unpaved Kv= 16.1 fps			
	0.3	149	0.0700	9.01	121.70				
	0.5	143	0.0700	9.01	121.70	Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'			
						n= 0.040			
	2.2	1,277	0.0800	9.64	130.10	Trap/Vee/Rect Channel Flow, CHANNEL 2			
		.,_,,	0.0000	0.01	100.10	Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'			
						n= 0.040			
_	9.6	2,034	Total						
	0.0	_,							

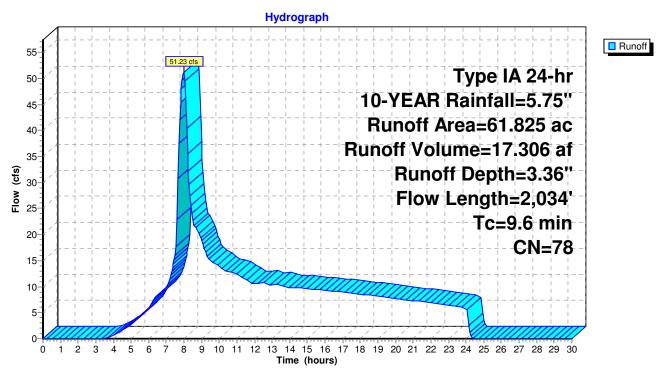


# **Summary for Subcatchment WATERSHED 2: WATERSHED 2**

Runoff = 51.23 cfs @ 7.99 hrs, Volume= 17.306 af, Depth= 3.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 10-YEAR Rainfall=5.75"

	Area	(ac) C	N Des	cription						
*	0.	000	0 , HS	G D						
	55.311		77 Brus	Brush, Fair, HSG D						
	1.217 89		39 Dirt	Dirt roads, HSG D						
	0.406		96 Grav	Gravel surface, HSG D						
	4.455		34 Past							
	0.180			1 ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '						
0.069 84 Vineyard, Fair, HSG D										
	0.187 98 Water Surface, HSG D									
	61.825 78 Weighted Average									
		548		5% Pervio						
0.277 0.45% Impervious Area					ous Area					
	-		01	\						
	Tc	Length	Slope	Velocity	Capacity	Description				
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)					
	5.5	100	0.1700	0.30		Sheet Flow, SHEET				
	4.0	<b>500</b>	0.4400	<b>5.04</b>		Grass: Dense n= 0.240 P2= 3.89"				
	1.6	508	0.1100	5.34		Shallow Concentrated Flow, SHALLOW				
	0.0	1.40	0.0700	0.01	101.70	Unpaved Kv= 16.1 fps				
	0.3	149	0.0700	9.01	121.70	•				
						Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040				
	2.2	1,277	0.0800	9.64	130.10	Trap/Vee/Rect Channel Flow, CHANNEL 2				
	2.2	1,2//	0.0000	9.04	130.10	Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'				
						n= 0.040				
	9.6	2,034	Total			11- 0.010				
	9.0	2,004	iotai							

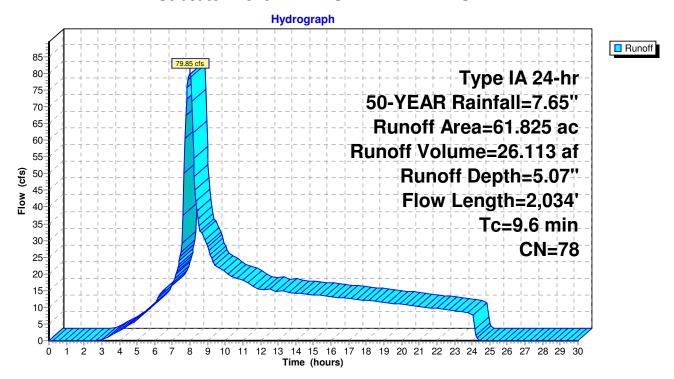


# **Summary for Subcatchment WATERSHED 2: WATERSHED 2**

Runoff = 79.85 cfs @ 7.98 hrs, Volume= 26.113 af, Depth= 5.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 50-YEAR Rainfall=7.65"

	Area	(ac) (	ON Des	cription					
*	* 0.000 0			, HSG D					
	55.311		77 Brus	Brush, Fair, HSG D					
	1.217 89		89 Dirt	Dirt roads, HSG D					
	0.406		96 Grav	Gravel surface, HSG D					
	4.455			Pasture/grassland/range, Fair, HSG D					
	0.180			1 ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '					
	0.069 84 Vineyard, Fai								
0.187 98 Water Surface, HSG D									
	61.825 78 Weighted Average								
		548	99.5	5% Pervio	us Area				
0.277 0.45% Impervious Area				% Impervi	ous Area				
	_								
	Tc	Length		Velocity	Capacity	Description			
	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)				
	5.5	100	0.1700	0.30		Sheet Flow, SHEET			
						Grass: Dense n= 0.240 P2= 3.89"			
	1.6	508	0.1100	5.34		Shallow Concentrated Flow, SHALLOW			
						Unpaved Kv= 16.1 fps			
	0.3	149	0.0700	9.01	121.70	•			
						Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'			
	0.0	4 077	0.0000	0.04	100 10	n= 0.040			
	2.2	1,277	0.0800	9.64	130.10	Trap/Vee/Rect Channel Flow, CHANNEL 2			
						Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'			
_	0.0	0.004	T l			n= 0.040			
	9.6	2,034	Total						

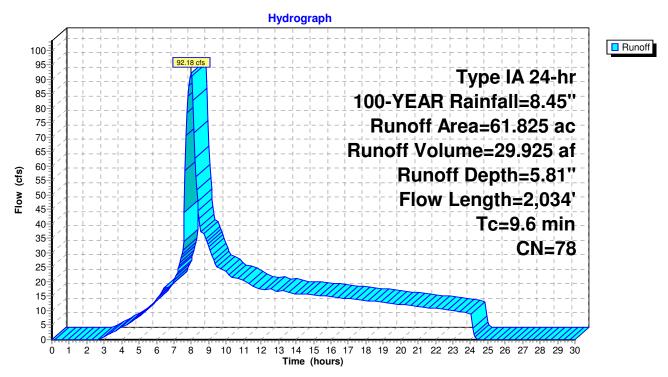


### **Summary for Subcatchment WATERSHED 2: WATERSHED 2**

Runoff = 92.18 cfs @ 7.98 hrs, Volume= 29.925 af, Depth= 5.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 100-YEAR Rainfall=8.45"

	Area	(ac)	CN	Desc	cription				
*	0.	.000 0 , HSG D							
	55.311 77		Brus	Brush, Fair, HSG D					
	1.	217	89	Dirt r	oads, HS0	G D			
	0.	406	96	Grav	el surface	, HSG D			
	4.	455	84	Past	ure/grassla	and/range,	Fair, HSG D		
	0.	180	93	Pave	ed roads w	open ditch	es, 50% imp, HSG D		
	0.	069	84	Vine	yard, Fair,	HSG D	·		
	0.	187	98	Wate	er Surface	, HSG D			
	61.	825	78	Weig	ghted Aver	age			
	61.	548		99.5	5% Pervio	us Area			
	0.	277		0.459	% Impervi	ous Area			
	Тс	Lengt	h .	Slope	Velocity	Capacity	Description		
_	(min)	(feet	:)	(ft/ft)	(ft/sec)	(cfs)			
	5.5	10	0 0	.1700	0.30		Sheet Flow, SHEET		
							Grass: Dense n= 0.240 P2= 3.89"		
	1.6	50	8 0	.1100	5.34		Shallow Concentrated Flow, SHALLOW		
							Unpaved Kv= 16.1 fps		
	0.3	14	9 0	.0700	9.01	121.70	•		
							Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'		
							n= 0.040		
	2.2	1,27	7 0	.0800	9.64	130.10	Trap/Vee/Rect Channel Flow, CHANNEL 2		
							Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'		
_							n= 0.040		
	9.6	2,03	4 T	otal					

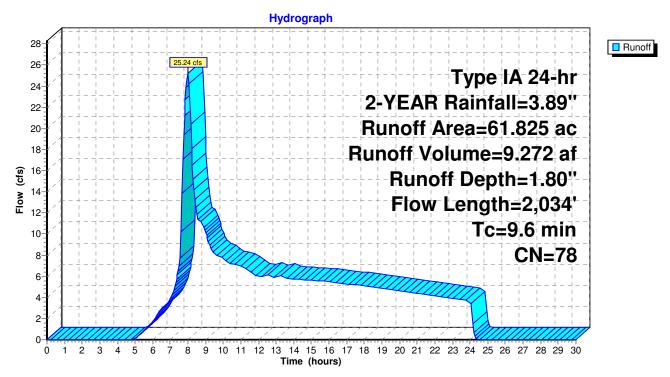


### **Summary for Subcatchment WATERSHED 2: WATERSHED 2**

Runoff = 25.24 cfs @ 8.02 hrs, Volume= 9.272 af, Depth= 1.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 2-YEAR Rainfall=3.89"

	Area	(ac)	CN	Desc	ription						
*	0.	000	0 , HSG D								
	48.	107	77	Brus	Brush, Fair, HSG D						
	1.	013	89	Dirt r	Dirt roads, HSG D						
	0.	406	96		el surface						
	2.	515	84				Fair, HSG D				
	_	177	93			•	es, 50% imp, HSG D				
		069	84		yard, Fair,						
		352	81		yard, Good						
_	0.	187	98	Wate	er Surface	<u>, HSG D</u>					
	61.	825	78	_	jhted Aver						
	_	550			5% Pervio						
	0.	275		0.45°	% Impervi	ous Area					
	т.	1	1.	01	M-11	0 '1	December 2017				
	Tc	Lengt		Slope	Velocity	Capacity	Description				
_	(min)	(fee		(ft/ft)	(ft/sec)	(cfs)					
	5.5	10	0 (	0.1700	0.30		Sheet Flow, SHEET				
	4.0	<b>50</b>			<b>5.04</b>		Grass: Dense n= 0.240 P2= 3.89"				
	1.6	50	8 (	0.1100	5.34		Shallow Concentrated Flow, SHALLOW				
	0.0	1.1	0 0	0.700	0.01	101.70	Unpaved Kv= 16.1 fps				
	0.3	14	9 (	0.0700	9.01	121.70	Trap/Vee/Rect Channel Flow, CHANNEL 1				
							Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040				
	2.2	1,27	7 (	0.080.0	9.80	110.27	Trap/Vee/Rect Channel Flow, CHANNEL 2				
	۷.۷	1,21	, (	.0000	3.00	110.27	Bot.W=3.00' D=1.50' Z= 3.0 '/' Top.W=12.00'				
							n= 0.040				
_	9.6	2,03	<u> </u>	 Fotal							
	5.0	۷,00	<del>-</del> - 1	ı Olai							



### **Ovid Post-Project**

Prepared by PPI Engineering.

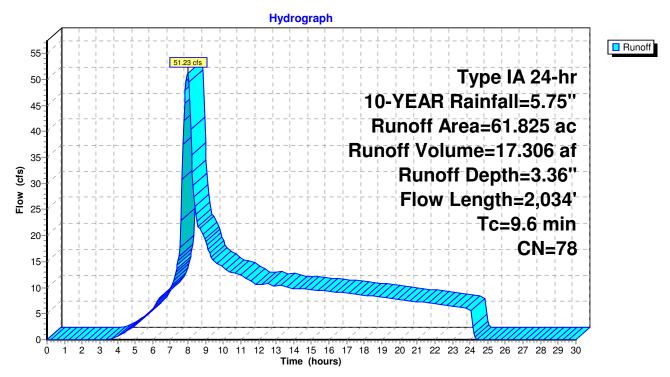
HydroCAD® 10.00-17 s/n 09429 © 2016 HydroCAD Software Solutions LLC

### **Summary for Subcatchment WATERSHED 2: WATERSHED 2**

Runoff = 51.23 cfs @ 7.99 hrs, Volume= 17.306 af, Depth= 3.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 10-YEAR Rainfall=5.75"

* 0.000
1.013       89       Dirt roads, HSG D         0.406       96       Gravel surface, HSG D         2.515       84       Pasture/grassland/range, Fair, HSG D         0.177       93       Paved roads w/open ditches, 50% imp, HSG D         0.069       84       Vineyard, Fair, HSG D         9.352       81       Vineyard, Good, HSG D         0.187       98       Water Surface, HSG D         61.825       78       Weighted Average         61.550       99.55% Pervious Area         0.275       0.45% Impervious Area         Tc       Length       Slope       Velocity       Capacity       Description         (min)       (feet)       (ft/ft)       (ft/sec)       (cfs)         5.5       100       0.1700       0.30       Sheet Flow, SHEET         Grass: Dense       n= 0.240       P2= 3.89"
0.406 96 Gravel surface, HSG D 2.515 84 Pasture/grassland/range, Fair, HSG D 0.177 93 Paved roads w/open ditches, 50% imp, HSG D 0.069 84 Vineyard, Fair, HSG D 9.352 81 Vineyard, Good, HSG D 0.187 98 Water Surface, HSG D 61.825 78 Weighted Average 61.550 99.55% Pervious Area 0.275 0.45% Impervious Area  Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs)  5.5 100 0.1700 0.30 Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.89"
2.515 84 Pasture/grassland/range, Fair, HSG D 0.177 93 Paved roads w/open ditches, 50% imp, HSG D 0.069 84 Vineyard, Fair, HSG D 9.352 81 Vineyard, Good, HSG D 0.187 98 Water Surface, HSG D 61.825 78 Weighted Average 61.550 99.55% Pervious Area 0.275 0.45% Impervious Area  Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs)  5.5 100 0.1700 0.30 Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.89"
0.177       93       Paved roads w/open ditches, 50% imp, HSG D         0.069       84       Vineyard, Fair, HSG D         9.352       81       Vineyard, Good, HSG D         0.187       98       Water Surface, HSG D         61.825       78       Weighted Average         61.550       99.55% Pervious Area         0.275       0.45% Impervious Area         Tc Length Slope Velocity Capacity (ft/ft) (ft/sec) (cfs)         5.5       100       0.1700       0.30       Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.89"
0.069       84       Vineyard, Fair, HSG D         9.352       81       Vineyard, Good, HSG D         0.187       98       Water Surface, HSG D         61.825       78       Weighted Average         61.550       99.55% Pervious Area         0.275       0.45% Impervious Area         Tc Length Slope Velocity Capacity (ft/ft) (ft/sec) (cfs)         Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.89"
9.352 81 Vineyard, Good, HSG D 0.187 98 Water Surface, HSG D 61.825 78 Weighted Average 61.550 99.55% Pervious Area 0.275 0.45% Impervious Area  Tc Length Slope Velocity Capacity (min) (feet) (ft/ft) (ft/sec) (cfs)  5.5 100 0.1700 0.30 Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.89"
0.187         98         Water Surface, HSG D           61.825         78         Weighted Average           61.550         99.55% Pervious Area           0.275         0.45% Impervious Area           Tc Length Slope Velocity Capacity (min) (feet) (ft/ft) (ft/sec) (cfs)         Description           5.5         100         0.1700         0.30         Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.89"
61.825 78 Weighted Average 61.550 99.55% Pervious Area 0.275 0.45% Impervious Area  Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs)  5.5 100 0.1700 0.30 Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.89"
61.550 99.55% Pervious Area 0.275 0.45% Impervious Area  Tc Length Slope Velocity Capacity (min) (feet) (ft/ft) (ft/sec) (cfs)  5.5 100 0.1700 0.30 Sheet Flow, SHEET  Grass: Dense n= 0.240 P2= 3.89"
0.275         0.45% Impervious Area           Tc         Length (min)         Slope (ft/ft)         Velocity (cfs)         Description           5.5         100         0.1700         0.30         Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.89"
Tc Length (min)         Slope (ft/ft)         Velocity (ft/sec)         Description           5.5         100         0.1700         0.30         Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.89"
(min)       (feet)       (ft/ft)       (ft/sec)       (cfs)         5.5       100       0.1700       0.30       Sheet Flow, SHEET         Grass: Dense       n= 0.240       P2= 3.89"
(min)       (feet)       (ft/ft)       (ft/sec)       (cfs)         5.5       100       0.1700       0.30       Sheet Flow, SHEET         Grass: Dense       n= 0.240       P2= 3.89"
5.5 100 0.1700 0.30 <b>Sheet Flow, SHEET</b> Grass: Dense n= 0.240 P2= 3.89"
Grass: Dense n= 0.240 P2= 3.89"
,
Unpaved Kv= 16.1 fps 0.3 149 0.0700 9.01 121.70 <b>Trap/Vee/Rect Channel Flow, CHANNEL 1</b>
Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'
n= 0.040
2.2 1,277 0.0800 9.80 110.27 <b>Trap/Vee/Rect Channel Flow, CHANNEL 2</b>
Bot.W=3.00' D=1.50' Z= 3.0 '/' Top.W=12.00'
n= 0.040
9.6 2,034 Total

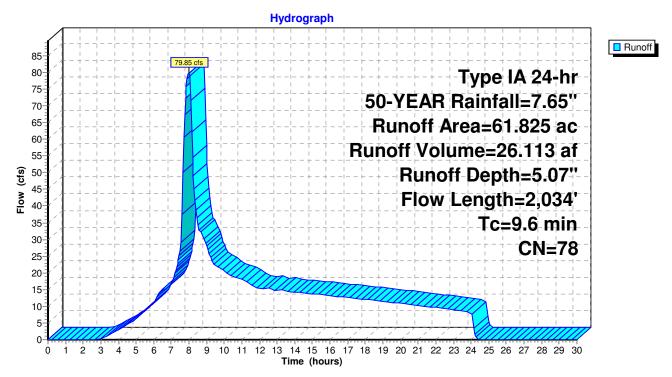


### **Summary for Subcatchment WATERSHED 2: WATERSHED 2**

Runoff = 79.85 cfs @ 7.98 hrs, Volume= 26.113 af, Depth= 5.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 50-YEAR Rainfall=7.65"

	Area	(ac) (	N Desc	cription					
*	0.	000	0 , HS						
	48.	107		h, Fair, HS					
				Dirt roads, HSG D					
				el surface					
				Pasture/grassland/range, Fair, HSG D					
	_			Paved roads w/open ditches, 50% imp, HSG D					
				Vineyard, Fair, HSG D Vineyard, Good, HSG D					
				er Surface	•				
				ghted Aver					
		550		5% Pervio					
	0.	275	0.45	% Impervi	ous Area				
	Тс	Length	Slope	Velocity	Capacity	Description			
	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	Description			
_	5.5	100		0.30	()	Sheet Flow, SHEET			
						Grass: Dense n= 0.240 P2= 3.89"			
	1.6	508	0.1100	5.34		Shallow Concentrated Flow, SHALLOW			
						Unpaved Kv= 16.1 fps			
	0.3	149	0.0700	9.01	121.70	Trap/Vee/Rect Channel Flow, CHANNEL 1			
						Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'			
						n= 0.040			
	2.2	1,277	0.0800	9.80	110.27	Trap/Vee/Rect Channel Flow, CHANNEL 2			
						Bot.W=3.00' D=1.50' Z= 3.0 '/' Top.W=12.00'			
						n= 0.040			
	9.6	2,034	Total						

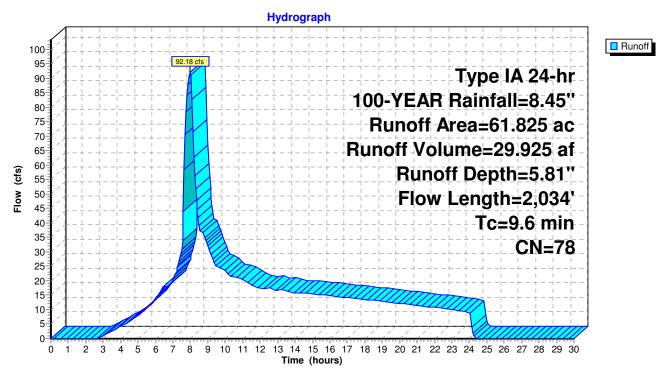


### **Summary for Subcatchment WATERSHED 2: WATERSHED 2**

Runoff = 92.18 cfs @ 7.98 hrs, Volume= 29.925 af, Depth= 5.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 100-YEAR Rainfall=8.45"

_	Area	(ac) C	N Desc	cription							
*	0.	000	0 , HS	G D							
	48.	107	77 Brus	sh, Fair, HS	SG D						
	1.	013	89 Dirt	Dirt roads, HSG D							
				Gravel surface, HSG D							
				Pasture/grassland/range, Fair, HSG D							
	_			Paved roads w/open ditches, 50% imp, HSG D							
				yard, Fair,							
				yard, Goo							
				er Surface	<i></i>						
				ghted Ave							
		550		99.55% Pervious Area 0.45% Impervious Area							
	0.	275	0.45	% impervi	ous Area						
	Тс	Length	Slope	Velocity	Capacity	Description					
	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)						
	5.5	100	0.1700	0.30	, ,	Sheet Flow, SHEET					
						Grass: Dense n= 0.240 P2= 3.89"					
	1.6	508	0.1100	5.34		Shallow Concentrated Flow, SHALLOW					
						Unpaved Kv= 16.1 fps					
	0.3	149	0.0700	9.01	121.70	Trap/Vee/Rect Channel Flow, CHANNEL 1					
						Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'					
					440.07	n= 0.040					
	2.2	1,277	0.0800	9.80	110.27	•					
						Bot.W=3.00' D=1.50' Z= 3.0 '/' Top.W=12.00'					
		0.004	<b>T</b>			n= 0.040					
	9.6	2,034	Total								

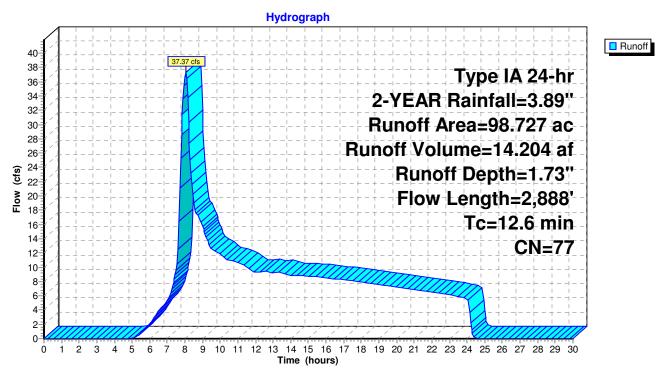


## **Summary for Subcatchment WATERSHED 3: WATERSHED 3**

Runoff = 37.37 cfs @ 8.05 hrs, Volume= 14.204 af, Depth= 1.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 2-YEAR Rainfall=3.89"

Area	(ac) C	N D	escription		
* 0.	000	0 ,	HSG D		
24.	857	70 B	rush, Fair, H	SG C	
47.	562	77 B	rush, Fair, H	SG D	
0.	144	87 D	irt roads, HS	G C	
1.	016	89 D	irt roads, HS	G D	
0.	284 9	96 G	ravel surface	e, HSG C	
0.	770	96 G	ravel surface	e, HSG D	
1.	468	79 P	asture/grassl	and/range,	Fair, HSG C
					Fair, HSG D
1.	701	80 P	asture/grassl	and/range,	Good, HSG D
			ineyard, Fair,		
3.	387		ineyard, Fair, Ioods, Fair, I		
0.					
98.	727	77 V	leighted Ave	rage	
98.	727	1	00.00% Perv	ious Area	
Tc	Length		•		Description
(min)	(feet)	(ft/	ft) (ft/sec)	(cfs)	
8.5	83	0.04	0.16		Sheet Flow, SHEET
					Grass: Dense n= 0.240 P2= 3.89"
2.8	1,572	0.33	9.25		Shallow Concentrated Flow, SHALLOW
					Unpaved Kv= 16.1 fps
0.4	511	0.34	00 19.87	268.22	
					Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'
					n= 0.040
0.9	722	0.14	00 12.75	172.11	Trap/Vee/Rect Channel Flow, CHANNEL 2
					Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'
					n= 0.040
12.6	2,888	Tota			

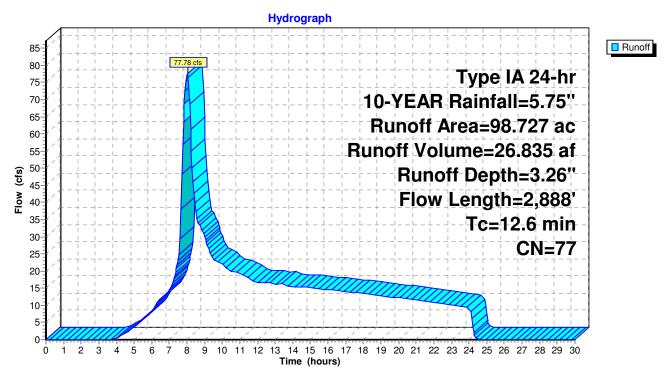


## **Summary for Subcatchment WATERSHED 3: WATERSHED 3**

Runoff = 77.78 cfs @ 8.03 hrs, Volume= 26.835 af, Depth= 3.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 10-YEAR Rainfall=5.75"

Area	(ac) C	N D	escription		
* 0.	000	0 ,	HSG D		
24.	857	70 B	rush, Fair, H	SG C	
47.	562	77 B	rush, Fair, H	SG D	
0.	144	87 D	irt roads, HS	G C	
1.	016	89 D	irt roads, HS	G D	
0.	284 9	96 G	ravel surface	e, HSG C	
0.	770	96 G	ravel surface	e, HSG D	
1.	468	79 P	asture/grassl	and/range,	Fair, HSG C
					Fair, HSG D
1.	701	80 P	asture/grassl	and/range,	Good, HSG D
			ineyard, Fair,		
3.	387		ineyard, Fair, Ioods, Fair, I		
0.					
98.	727	77 V	leighted Ave	rage	
98.	727	1	00.00% Perv	ious Area	
Tc	Length		•		Description
(min)	(feet)	(ft/	ft) (ft/sec)	(cfs)	
8.5	83	0.04	0.16		Sheet Flow, SHEET
					Grass: Dense n= 0.240 P2= 3.89"
2.8	1,572	0.33	9.25		Shallow Concentrated Flow, SHALLOW
					Unpaved Kv= 16.1 fps
0.4	511	0.34	00 19.87	268.22	
					Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'
					n= 0.040
0.9	722	0.14	00 12.75	172.11	Trap/Vee/Rect Channel Flow, CHANNEL 2
					Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'
					n= 0.040
12.6	2,888	Tota			

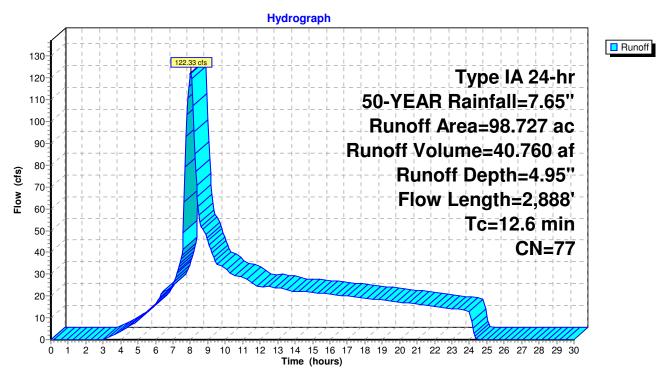


## **Summary for Subcatchment WATERSHED 3: WATERSHED 3**

Runoff = 122.33 cfs @ 8.02 hrs, Volume= 40.760 af, Depth= 4.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 50-YEAR Rainfall=7.65"

Area	ı (ac)	C١	l Desc	cription				
* (	0.000	(	, HS	G D				
24	1.857	70	) Brus	h, Fair, HS	SG C			
47	7.562	77	<sup>7</sup> Brus	h, Fair, HS	SG D			
C	).144	87	<sup>7</sup> Dirt r	roads, HS0	ЭC			
1	.016	89	Dirt r	oads, HS0	G D			
C	).284	96	Grav	el surface	, HSG C			
C	).770	96	Grav	el surface	, HSG D			
	.468	79				Fair, HSG C		
14	l.871	84		sture/grassland/range, Fair, HSG D				
	.701	80				Good, HSG D		
	2.312	79		yard, Fair,				
	3.387	84		yard, Fair,				
0.356 79 Woods, Fair, HSG D								
98	3.727	77		ghted Aver	•			
98	3.727		100.	00% Pervi	ous Area			
_	_							
Tc	9		Slope	Velocity	Capacity	Description		
(min)	(fee	et)	(ft/ft)	(ft/sec)	(cfs)			
8.5	8	33	0.0400	0.16		Sheet Flow, SHEET		
						Grass: Dense n= 0.240 P2= 3.89"		
2.8	1,57	′2	0.3300	9.25		Shallow Concentrated Flow, SHALLOW		
						Unpaved Kv= 16.1 fps		
0.4	51	1	0.3400	19.87	268.22	•		
						Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'		
						n= 0.040		
0.9	72	22	0.1400	12.75	172.11	Trap/Vee/Rect Channel Flow, CHANNEL 2		
						Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'		
						n= 0.040		
12.6	2,88	88	Total					

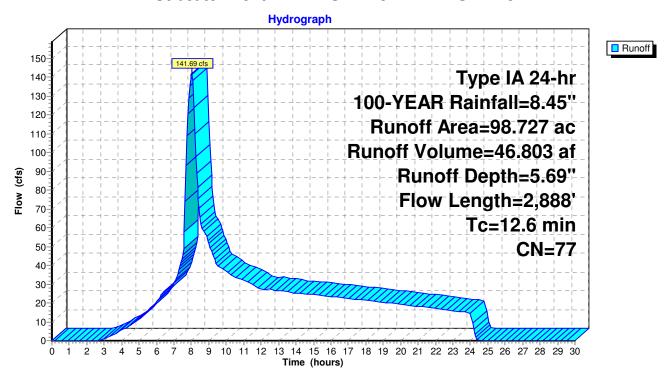


### **Summary for Subcatchment WATERSHED 3: WATERSHED 3**

Runoff = 141.69 cfs @ 8.02 hrs, Volume= 46.803 af, Depth= 5.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 100-YEAR Rainfall=8.45"

Area	(ac) (	CN	Desc	cription		
* 0.	000	0	, HS	G D		
24.	857	70	Brus	h, Fair, HS	SG C	
47.	562	77	Brus	h, Fair, HS	SG D	
0.	144	87	Dirt r	oads, HS0	G C	
			Dirt r	roads, HS0	G D	
0.	284			el surface		
				el surface		
1.	468					Fair, HSG C
14.						Fair, HSG D
						Good, HSG D
				yard, Fair,		
				yard, Fair,		
0.	356	79	Woo	ds, Fair, F	ISG D	
98.	727	77	Weig	ghted Aver	age	
98.	727		100.	00% Pervi	ous Area	
Tc	Length		ope	Velocity	Capacity	Description
(min)	(feet)	(f	t/ft)	(ft/sec)	(cfs)	
8.5	83	0.0	400	0.16		Sheet Flow, SHEET
						Grass: Dense n= 0.240 P2= 3.89"
2.8	1,572	0.3	300	9.25		Shallow Concentrated Flow, SHALLOW
						Unpaved Kv= 16.1 fps
0.4	511	0.3	400	19.87	268.22	Trap/Vee/Rect Channel Flow, CHANNEL 1
						Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'
						n= 0.040
0.9	722	0.1	400	12.75	172.11	Trap/Vee/Rect Channel Flow, CHANNEL 2
						Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'
						n= 0.040
12.6	2,888	Tot	al			

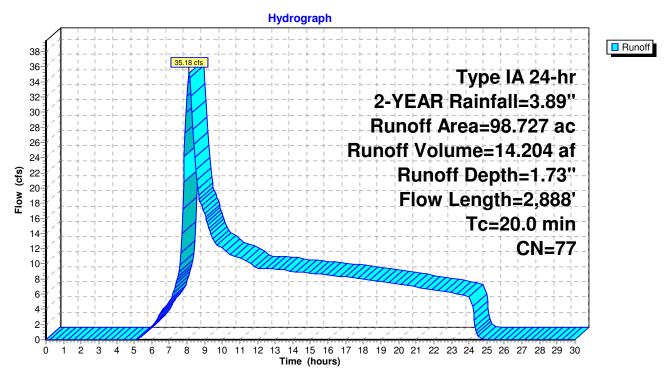


## **Summary for Subcatchment WATERSHED 3: WATERSHED 3**

Runoff = 35.18 cfs @ 8.13 hrs, Volume= 14.204 af, Depth= 1.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 2-YEAR Rainfall=3.89"

Area	(ac) C	N Desc	cription					
24.	857 7	'0 Brus	h, Fair, HS	SG C				
39.	39.303 77		Brush, Fair, HSG D					
0.	0.144 87		Dirt roads, HSG C					
_			roads, HS0					
			el surface					
			el surface	,				
					Fair, HSG C			
					Fair, HSG D			
			yard, Fair,					
			yard, Fair,					
			yard, Goo					
			ds, Fair, F					
			ghted Aver	•				
98.	727	100.	00% Pervi	ous Area				
_								
Tc	Length	Slope	Velocity	Capacity	Description			
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)				
8.5	83	0.0400	0.16		Sheet Flow, SHEET 1			
					Grass: Dense n= 0.240 P2= 3.89"			
2.8	727	0.0700	4.26		Shallow Concentrated Flow, SHALLOW 1			
	400				Unpaved Kv= 16.1 fps			
6.4	100	0.3200	0.26		Sheet Flow, SHEET 2			
4.0	745	0.5000	40.07		Woods: Light underbrush n= 0.400 P2= 3.89"			
1.0	745	0.5900	12.37		Shallow Concentrated Flow, SHALLOW 2			
0.4	E11	0.0400	10.07	060.00	Unpaved Kv= 16.1 fps			
0.4	511	0.3400	19.87	268.22	Trap/Vee/Rect Channel Flow, CHANNEL 1			
					Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00' n= 0.040			
0.9	722	0.1400	12.75	172.11	Trap/Vee/Rect Channel Flow, CHANNEL 2			
0.9	122	0.1400	12.73	172.11	Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'			
					n= 0.040			
20.0	2,888	Total			11- 0.010			
20.0	۷,000	i Ulai						



### **Ovid Post-Project**

Prepared by PPI Engineering.

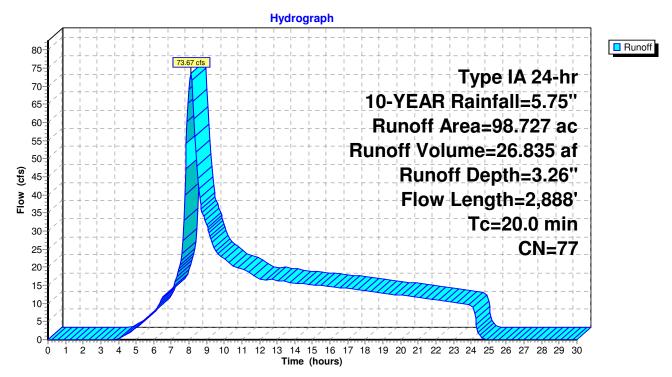
HydroCAD® 10.00-17 s/n 09429 © 2016 HydroCAD Software Solutions LLC

## **Summary for Subcatchment WATERSHED 3: WATERSHED 3**

Runoff = 73.67 cfs @ 8.11 hrs, Volume= 26.835 af, Depth= 3.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 10-YEAR Rainfall=5.75"

Area	(ac) C	N Desc	cription		
24.	857 7	'0 Brus	h, Fair, HS	SG C	
39.	303 7	7 Brus	h, Fair, HS	SG D	
0.	144 8	37 Dirt i	roads, HS0	G C	
			roads, HS0		
			el surface	•	
			el surface		
			0	0 /	Fair, HSG C
					Fair, HSG D
			yard, Fair,		
			yard, Fair,		
			yard, Good		
			ds, Fair, F		
		,	ghted Aver	•	
98.	727	100.	00% Pervi	ous Area	
Tc	Length	Slope	Velocity	Canacity	Description
(min)	(feet)	(ft/ft)	(ft/sec)	Capacity (cfs)	Description
8.5	83	0.0400	0.16	(013)	Sheet Flow, SHEET 1
0.5	00	0.0400	0.10		Grass: Dense n= 0.240 P2= 3.89"
2.8	727	0.0700	4.26		Shallow Concentrated Flow, SHALLOW 1
2.0	, _,	0.0700	1.20		Unpaved Kv= 16.1 fps
6.4	100	0.3200	0.26		Sheet Flow, SHEET 2
• • •		0.0_0			Woods: Light underbrush n= 0.400 P2= 3.89"
1.0	745	0.5900	12.37		Shallow Concentrated Flow, SHALLOW 2
					Unpaved Kv= 16.1 fps
0.4	511	0.3400	19.87	268.22	Trap/Vee/Rect Channel Flow, CHANNEL 1
					Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'
					n= 0.040
0.9	722	0.1400	12.75	172.11	Trap/Vee/Rect Channel Flow, CHANNEL 2
					Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'
					n= 0.040
20.0	2,888	Total			

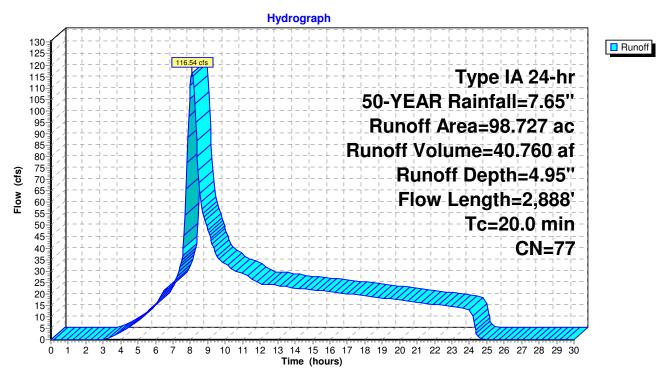


## **Summary for Subcatchment WATERSHED 3: WATERSHED 3**

Runoff = 116.54 cfs @ 8.10 hrs, Volume= 40.760 af, Depth= 4.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 50-YEAR Rainfall=7.65"

Area	(ac) C	N Desc	cription					
24.	857 7	70 Brus	h, Fair, HS	SG C				
39.	.303 77 Brush, Fair, HSG D							
0.	0.144 87		Dirt roads, HSG C					
			Dirt roads, HSG D					
			el surface					
			el surface	,				
					Fair, HSG C			
					Fair, HSG D			
			yard, Fair,					
			yard, Fair,					
			yard, Goo					
			ds, Fair, F					
			ghted Aver					
98.	727	100.	00% Pervi	ous Area				
Tc	Length	Slope	Velocity	Capacity	Description			
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	Description			
8.5	83	0.0400	0.16	(010)	Sheet Flow, SHEET 1			
0.5	00	0.0400	0.10		Grass: Dense n= 0.240 P2= 3.89"			
2.8	727	0.0700	4.26		Shallow Concentrated Flow, SHALLOW 1			
2.0	, _,	0.0700	1.20		Unpaved Kv= 16.1 fps			
6.4	100	0.3200	0.26		Sheet Flow, SHEET 2			
		0.0_0	•		Woods: Light underbrush n= 0.400 P2= 3.89"			
1.0	745	0.5900	12.37		Shallow Concentrated Flow, SHALLOW 2			
					Unpaved Kv= 16.1 fps			
0.4	511	0.3400	19.87	268.22	Trap/Vee/Rect Channel Flow, CHANNEL 1			
					Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'			
					n= 0.040			
0.9	722	0.1400	12.75	172.11	Trap/Vee/Rect Channel Flow, CHANNEL 2			
					Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'			
					n= 0.040			
20.0	2,888	Total						

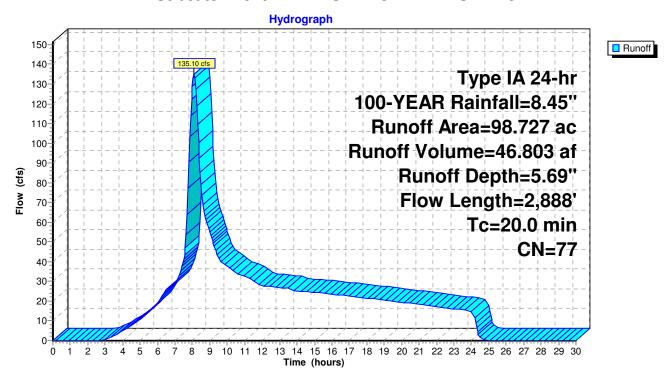


## **Summary for Subcatchment WATERSHED 3: WATERSHED 3**

Runoff = 135.10 cfs @ 8.10 hrs, Volume= 46.803 af, Depth= 5.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 100-YEAR Rainfall=8.45"

Area	(ac) C	N Desc	cription						
24.	857 7	'0 Brus	Brush, Fair, HSG C						
39.	303 7	77 Brus	Brush, Fair, HSG D						
			Dirt roads, HSG C						
			Dirt roads, HSG D						
			Gravel surface, HSG C						
			Gravel surface, HSG D						
			0	0 /	Fair, HSG C				
					Fair, HSG D				
			yard, Fair,						
			yard, Fair,						
			yard, Goo						
			ds, Fair, F						
	727 7 727	,	ghted Aver 00% Pervi	•					
96.	121	100.	00% Pervi	ous Area					
Тс	Length	Slope	Velocity	Capacity	Description				
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	Description				
8.5	83	0.0400	0.16	(010)	Sheet Flow, SHEET 1				
0.5	00	0.0+00	0.10		Grass: Dense n= 0.240 P2= 3.89"				
2.8	727	0.0700	4.26		Shallow Concentrated Flow, SHALLOW 1				
2.0	, _,	0.0700	1.20		Unpaved Kv= 16.1 fps				
6.4	100	0.3200	0.26		Sheet Flow, SHEET 2				
					Woods: Light underbrush n= 0.400 P2= 3.89"				
1.0	745	0.5900	12.37		Shallow Concentrated Flow, SHALLOW 2				
					Unpaved Kv= 16.1 fps				
0.4	511	0.3400	19.87	268.22	Trap/Vee/Rect Channel Flow, CHANNEL 1				
					Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'				
					n= 0.040				
0.9	722	0.1400	12.75	172.11	Trap/Vee/Rect Channel Flow, CHANNEL 2				
					Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'				
					n= 0.040				
20.0	2,888	Total							

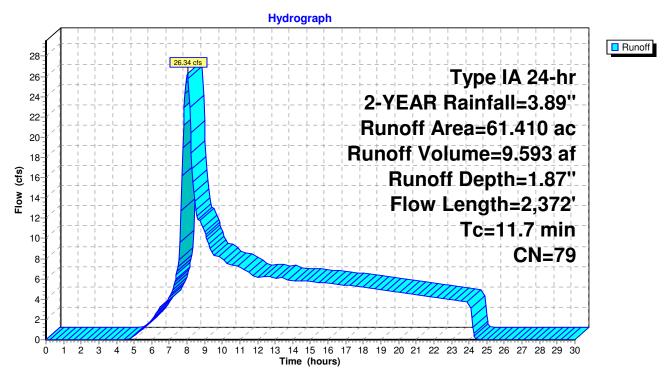


# **Summary for Subcatchment WATERSHED 4: WATERSHED 4**

Runoff = 26.34 cfs @ 8.03 hrs, Volume= 9.593 af, Depth= 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 2-YEAR Rainfall=3.89"

	Area (	(ac)	CN	Desc	cription					
*	0.0	000	0	, HS	G D					
	0.3	205	70	Brus	h, Fair, HS	SG C				
	45.	244	77	Brus	h, Fair, HS	SG D				
	0.0	609	89	Dirt r	oads, HS0	G D				
	0.5	212	96	Grav	el surface	, HSG D				
	8.	617	84	Past	ure/grassla	and/range,	Fair, HSG D			
	2.	162	93				ies, 50% imp, HSG D			
	4.	362	84		yard, Fair,	•	, , , , ,			
	61.4	410	79	Weig	hted Aver	age				
	60.	329		98.2	98.24% Pervious Area					
	1.081			1.76	1.76% Impervious Area					
					•					
	Tc	Lengt	h	Slope	Velocity	Capacity	Description			
(	(min)	(feet	t)	(ft/ft)	(ft/sec)	(cfs)	·			
	8.5	8	3 (	0.0400	0.16	,	Sheet Flow, SHEET			
							Grass: Dense n= 0.240 P2= 3.89"			
	2.0	95	2 (	0.2400	7.89		Shallow Concentrated Flow, SHALLOW			
							Unpaved Kv= 16.1 fps			
	1.2	1,33	7 (	0.3000	18.66	251.95	Trap/Vee/Rect Channel Flow, CHANNEL			
		,					Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'			
							n= 0.040			
	11.7	2,37	2	Fotal						

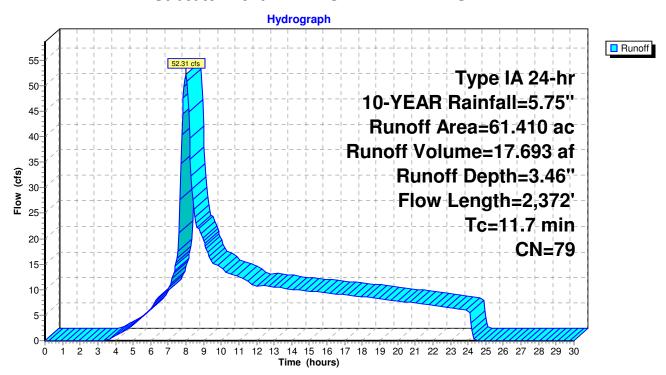


## **Summary for Subcatchment WATERSHED 4: WATERSHED 4**

Runoff = 52.31 cfs @ 8.02 hrs, Volume= 17.693 af, Depth= 3.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 10-YEAR Rainfall=5.75"

	Area (	(ac)	CN	Desc	cription					
*	0.0	000	0	, HS	G D					
	0.3	205	70	Brus	h, Fair, HS	SG C				
	45.	244	77	Brus	h, Fair, HS	SG D				
	0.0	609	89	Dirt r	oads, HS0	G D				
	0.5	212	96	Grav	el surface	, HSG D				
	8.	617	84	Past	ure/grassla	and/range,	Fair, HSG D			
	2.	162	93				ies, 50% imp, HSG D			
	4.	362	84		yard, Fair,	•	, , , , ,			
	61.4	410	79	Weig	hted Aver	age				
	60.	329		98.2	98.24% Pervious Area					
	1.081			1.76	1.76% Impervious Area					
					•					
	Tc	Lengt	h	Slope	Velocity	Capacity	Description			
(	(min)	(feet	t)	(ft/ft)	(ft/sec)	(cfs)	·			
	8.5	8	3 (	0.0400	0.16	,	Sheet Flow, SHEET			
							Grass: Dense n= 0.240 P2= 3.89"			
	2.0	95	2 (	0.2400	7.89		Shallow Concentrated Flow, SHALLOW			
							Unpaved Kv= 16.1 fps			
	1.2	1,33	7 (	0.3000	18.66	251.95	Trap/Vee/Rect Channel Flow, CHANNEL			
		,					Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'			
							n= 0.040			
	11.7	2,37	2	Fotal						

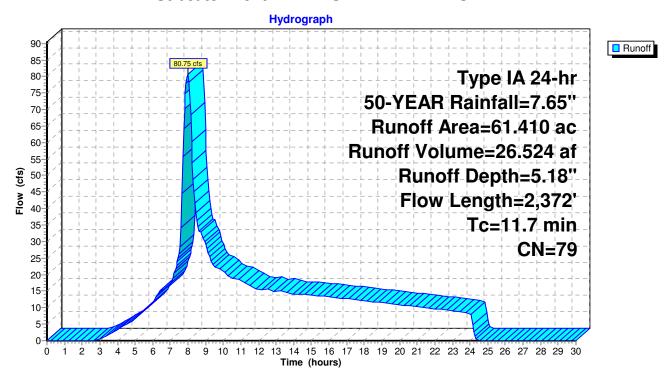


### **Summary for Subcatchment WATERSHED 4: WATERSHED 4**

Runoff = 80.75 cfs @ 8.00 hrs, Volume= 26.524 af, Depth= 5.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 50-YEAR Rainfall=7.65"

	Area	(ac)	CN	Desc	cription						
*	0.	000	0	, HS	G D						
	0.	205	70	Brus	h, Fair, HS	SG C					
	45.	244	77	Brus	h, Fair, HS	SG D					
	0.	609	89	Dirt ı	virt roads, HSG D						
	0.	212	96	Grav	Gravel surface, HSG D						
	8.	617	84	Past	ure/grassla	and/range,	Fair, HSG D				
	2.	162	93	Pave	ed roads w	open ditch	nes, 50% imp, HSG D				
	4.	362	84	Vine	yard, Fair,	HSG D					
	61.	410	79	Weig	ghted Aver	age					
	60.	329		98.2	98.24% Pervious Area						
	1.081			1.76	% Impervi	ous Area					
	Tc	Lengt	th	Slope	Velocity	Capacity	Description				
	(min)	(fee	t)	(ft/ft)	(ft/sec)	(cfs)					
	8.5	8	3 (	0.0400	0.16		Sheet Flow, SHEET				
							Grass: Dense n= 0.240 P2= 3.89"				
	2.0	95	2 (	0.2400	7.89		Shallow Concentrated Flow, SHALLOW				
							Unpaved Kv= 16.1 fps				
	1.2	1,33	7 (	0.3000	18.66	251.95	Trap/Vee/Rect Channel Flow, CHANNEL				
							Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'				
							n= 0.040				
	11.7	2,37	2	Total							

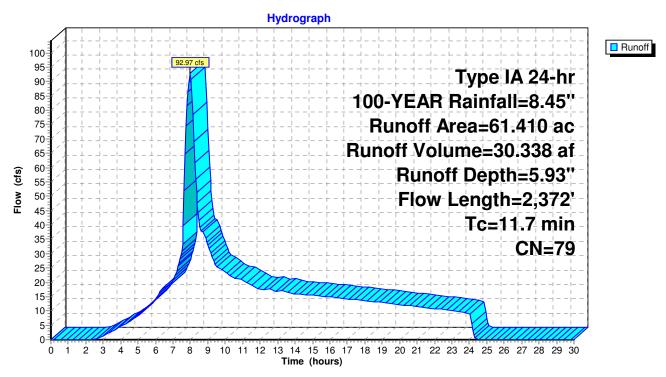


## **Summary for Subcatchment WATERSHED 4: WATERSHED 4**

Runoff = 92.97 cfs @ 8.00 hrs, Volume= 30.338 af, Depth= 5.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 100-YEAR Rainfall=8.45"

	Area	(ac)	CN	Desc	cription						
*	0.	000	0	, HSG D							
	0.	205	70	Brus	h, Fair, HS	SG C					
	45.	244	77	Brus	Brush, Fair, HSG D						
	0.	609	89	Dirt r	Dirt roads, HSG D						
	0.	212	96	Grav	el surface	, HSG D					
	8.	617	84	Past	ure/grassla	and/range,	Fair, HSG D				
	2.	162	93	Pave	ed roads w	open ditch	ies, 50% imp, HSG D				
	4.	362	84	Vine	yard, Fair,	HSG D					
	61.	410	79	Weig	hted Aver	age					
	60.329			98.2	98.24% Pervious Area						
	1.081			1.76	% Impervi	ous Area					
					•						
	Tc	Lengt	h .	Slope	Velocity	Capacity	Description				
	(min)	(fee	t)	(ft/ft)	(ft/sec)	(cfs)	·				
	8.5	8	3 0	.0400	0.16		Sheet Flow, SHEET				
							Grass: Dense n= 0.240 P2= 3.89"				
	2.0	95	2 0	.2400	7.89		Shallow Concentrated Flow, SHALLOW				
							Unpaved Kv= 16.1 fps				
	1.2	1,33	7 0	.3000	18.66	251.95	Trap/Vee/Rect Channel Flow, CHANNEL				
		-					Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'				
							n= 0.040				
	11.7	2,37	2 T	otal							



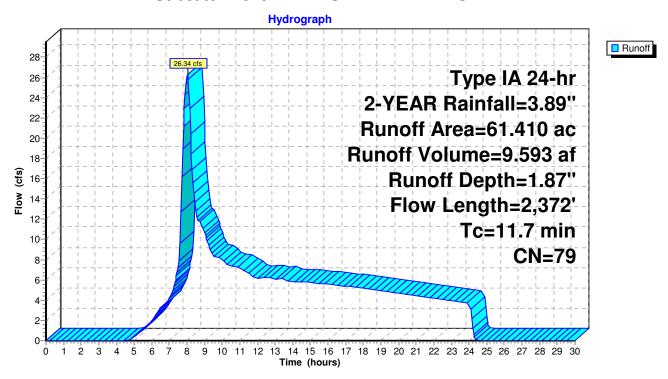
# **Summary for Subcatchment WATERSHED 4: WATERSHED 4**

Runoff = 26.34 cfs @ 8.03 hrs, Volume= 9.593 af, Depth= 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 2-YEAR Rainfall=3.89"

	Area	(ac)	CN	Desc	cription						
*	0.	000	0	, HS	G D						
	0.	205	70	Brus	h, Fair, HS	SG C					
	42.	726	77	Brus	h, Fair, HS	SG D					
	0.	503	89	Dirt ı	roads, HS0	ads, HSG D					
	0.	212	96	Grav	el surface	, HSG D					
	1.	241	84	Past	ure/grassla	and/range,	Fair, HSG D				
	2.	144	93	Pave	ed roads w	open ditch	es, 50% imp, HSG D				
		362	84		yard, Fair,						
	10.	017	81	Vine	yard, Good	d, HSG D					
	61.	410	79	Weig	ghted Aver	age					
	60.	338		98.2	98.25% Pervious Area						
1.072				1.75	1.75% Impervious Area						
	Тс	Lengt		Slope	Velocity	Capacity	Description				
	(min)	(fee	t)	(ft/ft)	(ft/sec)	(cfs)					
	8.5	8	3 0	0.0400	0.16		Sheet Flow, SHEET				
							Grass: Dense n= 0.240 P2= 3.89"				
	2.0	95	2 0	).2400	7.89		Shallow Concentrated Flow, SHALLOW				
							Unpaved Kv= 16.1 fps				
	1.2	1,33	7 0	0.3000	18.66	251.95	Trap/Vee/Rect Channel Flow, CHANNEL				
							Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'				
_							n= 0.040				
	11.7	2,37	2 T	<b>Total</b>							

#### **Subcatchment WATERSHED 4: WATERSHED 4**



## **Ovid Post-Project**

Prepared by PPI Engineering.

HydroCAD® 10.00-17 s/n 09429 © 2016 HydroCAD Software Solutions LLC

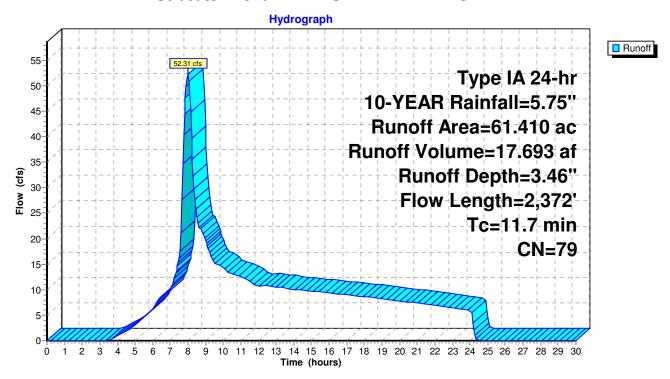
# **Summary for Subcatchment WATERSHED 4: WATERSHED 4**

Runoff = 52.31 cfs @ 8.02 hrs, Volume= 17.693 af, Depth= 3.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 10-YEAR Rainfall=5.75"

	Area	Area (ac) CN		Description						
*	0.	000	00 0		, HSG D					
	0.	205 70		Brush, Fair, HSG C						
	42.	726	77	Brus	Brush, Fair, HSG D					
	0.	0.503 89		Dirt ı	Dirt roads, HSG D					
	0.	0.212		Gravel surface, HSG D						
	1.241		84	Pasture/grassland/range, Fair, HSG D						
			93	Paved roads w/open ditches, 50% imp, HSG D						
	4.362 84			Vine	Vineyard, Fair, HSG D					
	10.017 81 Vineyard, Good,									
	61.	61.410 79			Weighted Average					
	60.338			98.25% Pervious Area						
	1.072			1.75	% Impervi	ous Area				
					•					
	Tc	Lengt	h	Slope	Velocity	Capacity	Description			
	(min)	(fee	t)	(ft/ft)	(ft/sec)	(cfs)				
	8.5	8	3 0	.0400	0.16		Sheet Flow, SHEET			
							Grass: Dense n= 0.240 P2= 3.89"			
	2.0	95	2 0	.2400	7.89		Shallow Concentrated Flow, SHALLOW			
							Unpaved Kv= 16.1 fps			
	1.2	1,33	7 0	.3000	18.66	251.95	Trap/Vee/Rect Channel Flow, CHANNEL			
							Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'			
_							n= 0.040			
	11.7	2,37	2 T	otal						

#### **Subcatchment WATERSHED 4: WATERSHED 4**



# **Ovid Post-Project**

Prepared by PPI Engineering.

HydroCAD® 10.00-17 s/n 09429 © 2016 HydroCAD Software Solutions LLC

# **Summary for Subcatchment WATERSHED 4: WATERSHED 4**

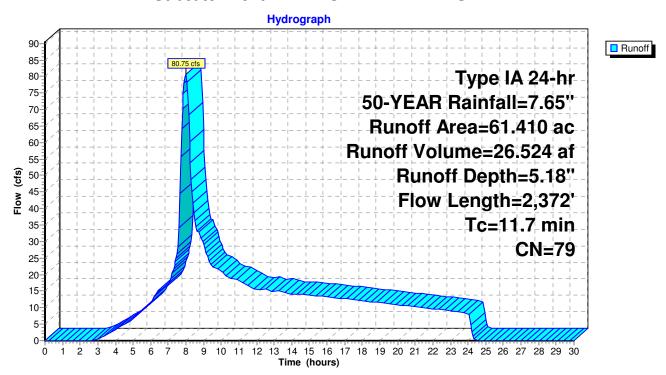
Runoff = 80.75 cfs @ 8.00 hrs, Volume= 26.524 af, Depth= 5.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 50-YEAR Rainfall=7.65"

	Area	Area (ac) CN			Description						
*	0.	000	0	, HS	G D						
	0.	205	70	Brus	h, Fair, HS	SG C					
	42.	42.726 77			Brush, Fair, HSG D						
	0.	503	89	Dirt roads, HSG D							
	0.	212	96	Gravel surface, HSG D							
	1.241 84			Pasture/grassland/range, Fair, HSG D							
	2.144 93			Pave	Paved roads w/open ditches, 50% imp, HSG D						
4.362 84 Vineyard, Fair, HSG D											
_	10.017 81 Vineyard, Good, HS										
	61.410 79 Weighted Average										
	60.	338		98.25% Pervious Area							
	1.072				1.75% Impervious Area						
	Тс	Length		Slope	Velocity	Capacity	Description				
	(min)	(feet	)	(ft/ft)	(ft/sec)	(cfs)					
	8.5	83	3 0.	0400	0.16		Sheet Flow, SHEET				
							Grass: Dense n= 0.240 P2= 3.89"				
	2.0	952	2 0.	2400	7.89		Shallow Concentrated Flow, SHALLOW				
							Unpaved Kv= 16.1 fps				
	1.2	1,337	7 0.	3000	18.66	251.95	· · · · · · · · · · · · · · · · · · ·				
							Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'				
_							n= 0.040				
	117	2 27	) T	s+ol							

11.7 2,372 Total

#### **Subcatchment WATERSHED 4: WATERSHED 4**



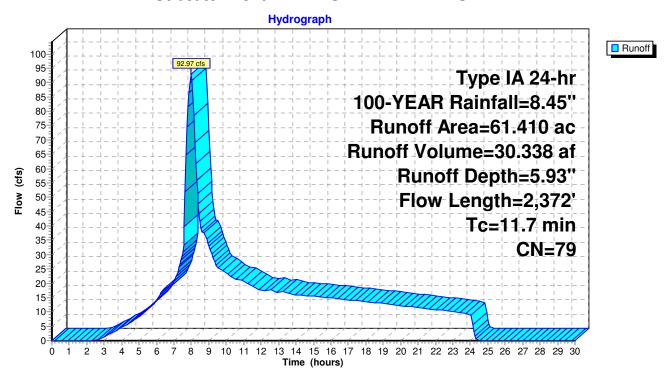
# **Summary for Subcatchment WATERSHED 4: WATERSHED 4**

Runoff = 92.97 cfs @ 8.00 hrs, Volume= 30.338 af, Depth= 5.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs Type IA 24-hr 100-YEAR Rainfall=8.45"

	Area	Area (ac) CN			Description					
*	0.	000	0	, HS	, HSG D					
	0.	205	70	Brus	Brush, Fair, HSG C					
	42.726 77			Brus	Brush, Fair, HSG D					
	0.	0.503 89			Dirt roads, HSG D					
	0.212 96			Grav	Gravel surface, HSG D					
	1.241 84			Past	Pasture/grassland/range, Fair, HSG D					
	2.	144	93	Pave	Paved roads w/open ditches, 50% imp, HSG D					
	4.362 84 Vineyard, Fair, HSG D									
	10.	017	81	Vine	yard, Good	d, HSG D				
	61.410 79 Weighted Average									
	60.338			98.2	98.25% Pervious Area					
	1.	072		1.75	1.75% Impervious Area					
	Тс	Lengt		Slope	Velocity	Capacity	Description			
	(min)	(fee	t)	(ft/ft)	(ft/sec)	(cfs)				
	8.5	8	3 0	0.0400	0.16		Sheet Flow, SHEET			
							Grass: Dense n= 0.240 P2= 3.89"			
	2.0	95	2 0	.2400	7.89		Shallow Concentrated Flow, SHALLOW			
							Unpaved Kv= 16.1 fps			
	1.2	1,33	7 0	0.3000	18.66	251.95	Trap/Vee/Rect Channel Flow, CHANNEL			
							Bot.W=3.00' D=1.50' Z= 4.0 '/' Top.W=15.00'			
_							n= 0.040			
	11.7	2,37	2 T	otal						

#### **Subcatchment WATERSHED 4: WATERSHED 4**



## **Ovid Pre-Project**

Prepared by PPI Engineering.

HydroCAD® 10.00-17 s/n 09429 © 2016 HydroCAD Software Solutions LLC

## Summary for Reach R1: REACH 1

Inflow Area = 61.410 ac, 1.76% Impervious, Inflow Depth = 1.87" for 2-YEAR event

Inflow = 26.34 cfs @ 8.03 hrs, Volume= 9.593 af

Outflow = 25.76 cfs @ 8.15 hrs, Volume= 9.593 af, Atten= 2%, Lag= 6.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Max. Velocity= 6.99 fps, Min. Travel Time= 4.6 min Avg. Velocity = 3.62 fps, Avg. Travel Time= 8.8 min

Peak Storage= 7,059 cf @ 8.08 hrs Average Depth at Peak Storage= 0.66'

Bank-Full Depth= 1.50' Flow Area= 13.5 sf, Capacity= 150.00 cfs

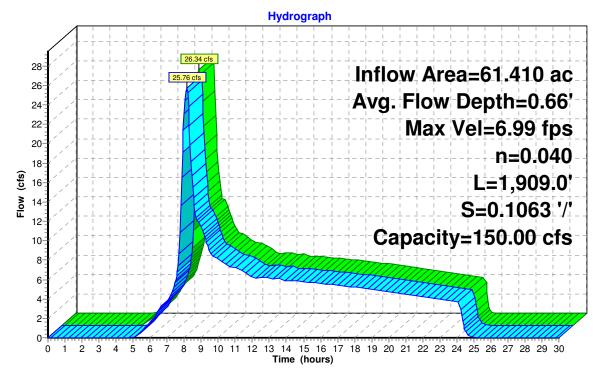
3.00' x 1.50' deep channel, n= 0.040 Mountain streams

Side Slope Z-value= 4.0 '/' Top Width= 15.00'

Length= 1,909.0' Slope= 0.1063 '/'



Reach R1: REACH 1



## **Ovid Pre-Project**

Prepared by PPI Engineering.

HydroCAD® 10.00-17 s/n 09429 © 2016 HydroCAD Software Solutions LLC

### Summary for Reach R1: REACH 1

Inflow Area = 61.410 ac, 1.76% Impervious, Inflow Depth = 3.46" for 10-YEAR event

Inflow = 52.31 cfs @ 8.02 hrs, Volume= 17.693 af

Outflow = 51.72 cfs @ 8.11 hrs, Volume= 17.692 af, Atten= 1%, Lag= 5.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Max. Velocity= 8.43 fps, Min. Travel Time= 3.8 min Avg. Velocity = 4.24 fps, Avg. Travel Time= 7.5 min

Peak Storage= 11,741 cf @ 8.05 hrs Average Depth at Peak Storage= 0.92'

Bank-Full Depth= 1.50' Flow Area= 13.5 sf, Capacity= 150.00 cfs

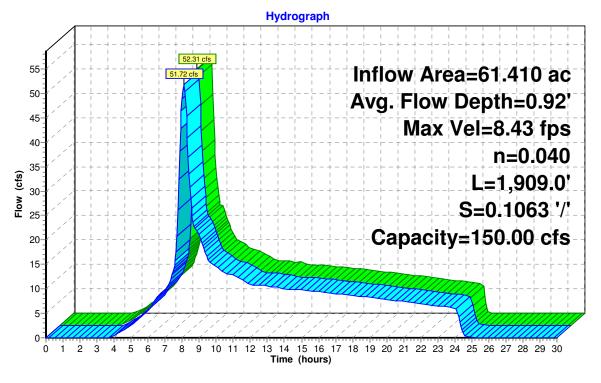
3.00' x 1.50' deep channel, n= 0.040 Mountain streams

Side Slope Z-value= 4.0 '/' Top Width= 15.00'

Length= 1,909.0' Slope= 0.1063 '/'



Reach R1: REACH 1



## **Ovid Pre-Project**

Prepared by PPI Engineering.

HydroCAD® 10.00-17 s/n 09429 © 2016 HydroCAD Software Solutions LLC

### Summary for Reach R1: REACH 1

Inflow Area = 61.410 ac, 1.76% Impervious, Inflow Depth = 5.18" for 50-YEAR event

Inflow = 80.75 cfs @ 8.00 hrs, Volume= 26.524 af

Outflow = 80.20 cfs @ 8.09 hrs, Volume= 26.524 af, Atten= 1%, Lag= 5.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Max. Velocity= 9.45 fps, Min. Travel Time= 3.4 min Avg. Velocity = 4.71 fps, Avg. Travel Time= 6.8 min

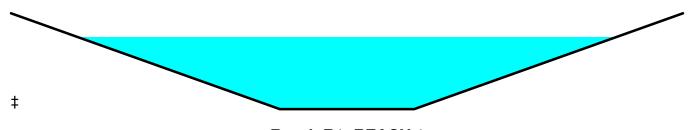
Peak Storage= 16,212 cf @ 8.04 hrs Average Depth at Peak Storage= 1.13'

Bank-Full Depth= 1.50' Flow Area= 13.5 sf, Capacity= 150.00 cfs

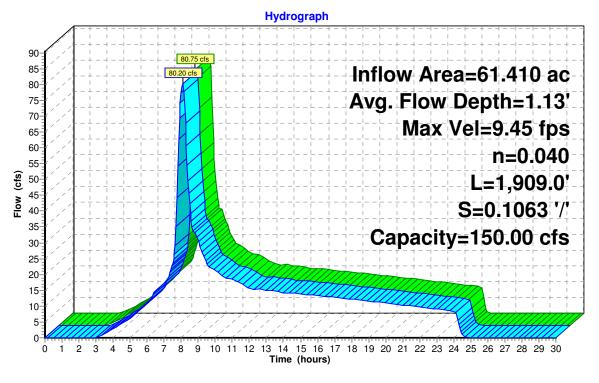
3.00' x 1.50' deep channel, n= 0.040 Mountain streams

Side Slope Z-value= 4.0 '/' Top Width= 15.00'

Length= 1,909.0' Slope= 0.1063 '/'



Reach R1: REACH 1



HydroCAD® 10.00-17 s/n 09429 © 2016 HydroCAD Software Solutions LLC

### Summary for Reach R1: REACH 1

Inflow Area = 61.410 ac, 1.76% Impervious, Inflow Depth = 5.93" for 100-YEAR event

Inflow = 92.97 cfs @ 8.00 hrs, Volume= 30.338 af

Outflow = 92.44 cfs @ 8.09 hrs, Volume= 30.338 af, Atten= 1%, Lag= 5.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Max. Velocity= 9.81 fps, Min. Travel Time= 3.2 min Avg. Velocity = 4.88 fps, Avg. Travel Time= 6.5 min

Peak Storage= 18,004 cf @ 8.03 hrs Average Depth at Peak Storage= 1.21'

Bank-Full Depth= 1.50' Flow Area= 13.5 sf, Capacity= 150.00 cfs

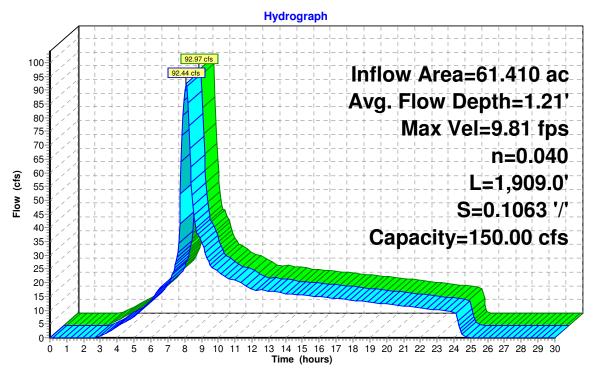
3.00' x 1.50' deep channel, n= 0.040 Mountain streams

Side Slope Z-value= 4.0 '/' Top Width= 15.00'

Length= 1,909.0' Slope= 0.1063 '/'



Reach R1: REACH 1



### **Ovid Post-Project**

Prepared by PPI Engineering.

HydroCAD® 10.00-17 s/n 09429 © 2016 HydroCAD Software Solutions LLC

### Summary for Reach R1: REACH 1

Inflow Area = 61.410 ac, 1.75% Impervious, Inflow Depth = 1.87" for 2-YEAR event

Inflow = 26.34 cfs @ 8.03 hrs, Volume= 9.593 af

Outflow = 25.76 cfs @ 8.15 hrs, Volume= 9.593 af, Atten= 2%, Lag= 6.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Max. Velocity= 6.99 fps, Min. Travel Time= 4.6 min Avg. Velocity = 3.62 fps, Avg. Travel Time= 8.8 min

Peak Storage= 7,059 cf @ 8.08 hrs Average Depth at Peak Storage= 0.66'

Bank-Full Depth= 1.50' Flow Area= 13.5 sf, Capacity= 150.00 cfs

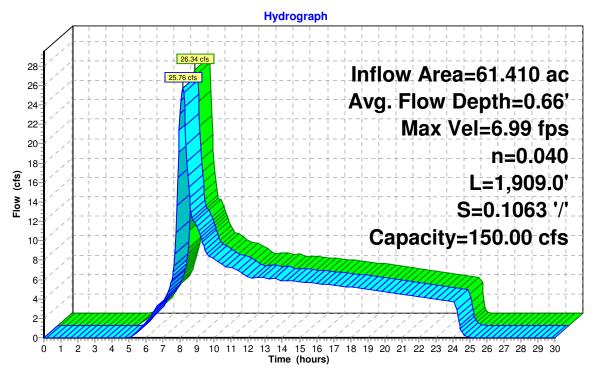
3.00' x 1.50' deep channel, n= 0.040 Mountain streams

Side Slope Z-value= 4.0 '/' Top Width= 15.00'

Length= 1,909.0' Slope= 0.1063 '/'



Reach R1: REACH 1



### **Ovid Post-Project**

Prepared by PPI Engineering.

HydroCAD® 10.00-17 s/n 09429 © 2016 HydroCAD Software Solutions LLC

## Summary for Reach R1: REACH 1

Inflow Area = 61.410 ac, 1.75% Impervious, Inflow Depth = 3.46" for 10-YEAR event

Inflow = 52.31 cfs @ 8.02 hrs, Volume= 17.693 af

Outflow = 51.72 cfs @ 8.11 hrs, Volume= 17.692 af, Atten= 1%, Lag= 5.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Max. Velocity= 8.43 fps, Min. Travel Time= 3.8 min Avg. Velocity = 4.24 fps, Avg. Travel Time= 7.5 min

Peak Storage= 11,741 cf @ 8.05 hrs Average Depth at Peak Storage= 0.92'

Bank-Full Depth= 1.50' Flow Area= 13.5 sf, Capacity= 150.00 cfs

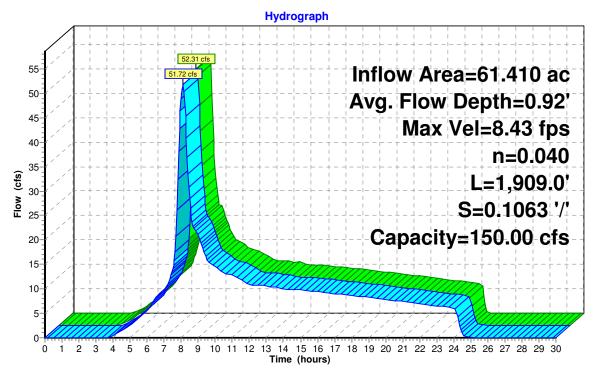
3.00' x 1.50' deep channel, n= 0.040 Mountain streams

Side Slope Z-value= 4.0 '/' Top Width= 15.00'

Length= 1,909.0' Slope= 0.1063 '/'



Reach R1: REACH 1



### **Ovid Post-Project**

Prepared by PPI Engineering.

HydroCAD® 10.00-17 s/n 09429 © 2016 HydroCAD Software Solutions LLC

### Summary for Reach R1: REACH 1

Inflow Area = 61.410 ac, 1.75% Impervious, Inflow Depth = 5.18" for 50-YEAR event

Inflow = 80.75 cfs @ 8.00 hrs, Volume= 26.524 af

Outflow = 80.20 cfs @ 8.09 hrs, Volume= 26.524 af, Atten= 1%, Lag= 5.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Max. Velocity= 9.45 fps, Min. Travel Time= 3.4 min Avg. Velocity = 4.71 fps, Avg. Travel Time= 6.8 min

Peak Storage= 16,212 cf @ 8.04 hrs Average Depth at Peak Storage= 1.13'

Bank-Full Depth= 1.50' Flow Area= 13.5 sf, Capacity= 150.00 cfs

3.00' x 1.50' deep channel, n= 0.040 Mountain streams

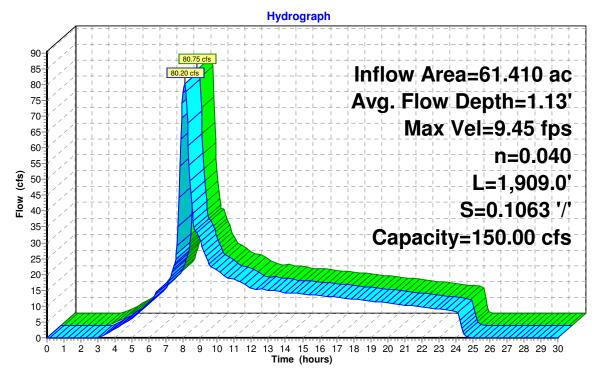
Side Slope Z-value= 4.0 '/' Top Width= 15.00'

Length= 1,909.0' Slope= 0.1063 '/'

Inlet Invert= 685.00', Outlet Invert= 482.00'



#### Reach R1: REACH 1



## **Ovid Post-Project**

Prepared by PPI Engineering.

HydroCAD® 10.00-17 s/n 09429 © 2016 HydroCAD Software Solutions LLC

### Summary for Reach R1: REACH 1

Inflow Area = 61.410 ac, 1.75% Impervious, Inflow Depth = 5.93" for 100-YEAR event

Inflow = 92.97 cfs @ 8.00 hrs, Volume= 30.338 af

Outflow = 92.44 cfs @ 8.09 hrs, Volume= 30.338 af, Atten= 1%, Lag= 5.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Max. Velocity= 9.81 fps, Min. Travel Time= 3.2 min Avg. Velocity = 4.88 fps, Avg. Travel Time= 6.5 min

Peak Storage= 18,004 cf @ 8.03 hrs Average Depth at Peak Storage= 1.21'

Bank-Full Depth= 1.50' Flow Area= 13.5 sf, Capacity= 150.00 cfs

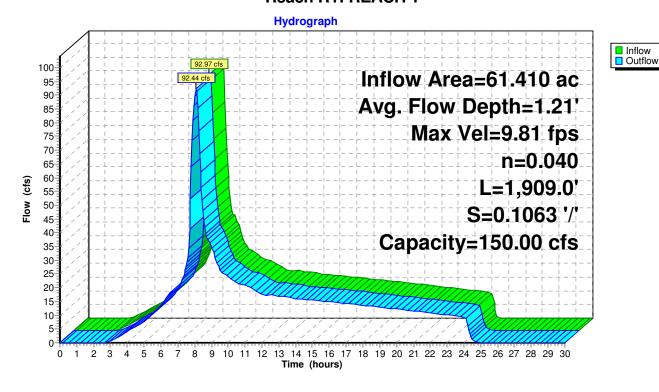
3.00' x 1.50' deep channel, n= 0.040 Mountain streams

Side Slope Z-value= 4.0 '/' Top Width= 15.00'

Length= 1,909.0' Slope= 0.1063 '/'



Reach R1: REACH 1



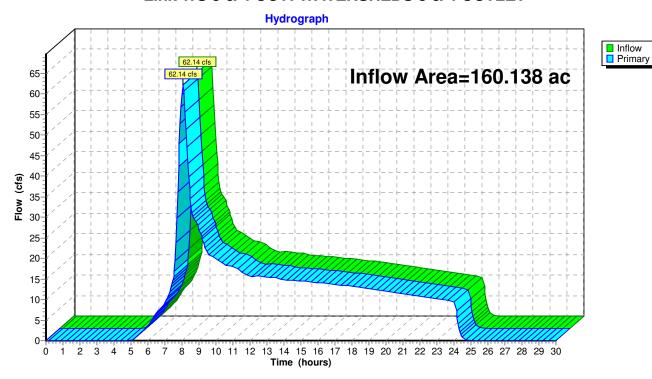
## Summary for Link WS 3 & 4 OUT: WATERSHEDS 3 & 4 OUTLET

Inflow Area = 160.138 ac, 0.68% Impervious, Inflow Depth = 1.78" for 2-YEAR event

Inflow = 62.14 cfs @ 8.08 hrs, Volume= 23.797 af

Primary = 62.14 cfs @ 8.08 hrs, Volume= 23.797 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs



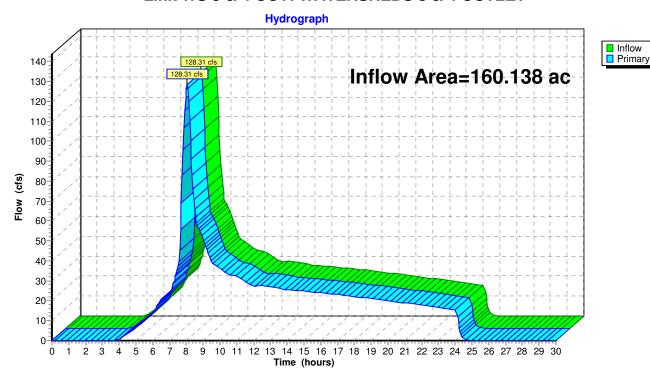
## Summary for Link WS 3 & 4 OUT: WATERSHEDS 3 & 4 OUTLET

Inflow Area = 160.138 ac, 0.68% Impervious, Inflow Depth = 3.34" for 10-YEAR event

Inflow = 128.31 cfs @ 8.05 hrs, Volume= 44.528 af

Primary = 128.31 cfs @ 8.05 hrs, Volume= 44.528 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs



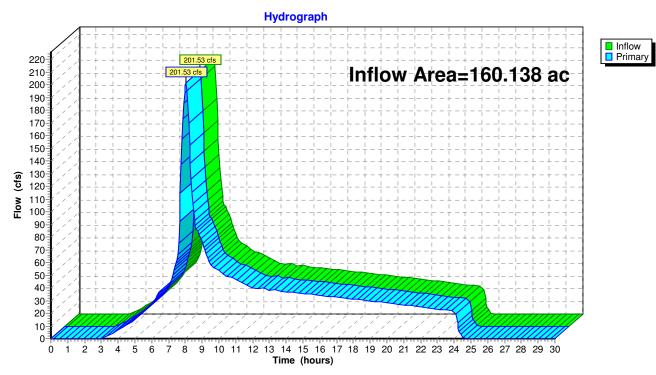
# Summary for Link WS 3 & 4 OUT: WATERSHEDS 3 & 4 OUTLET

Inflow Area = 160.138 ac, 0.68% Impervious, Inflow Depth = 5.04" for 50-YEAR event

Inflow = 201.53 cfs @ 8.04 hrs, Volume= 67.284 af

Primary = 201.53 cfs @ 8.04 hrs, Volume= 67.284 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs



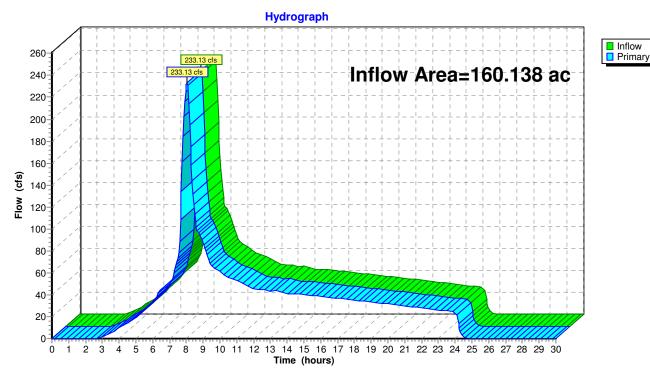
# Summary for Link WS 3 & 4 OUT: WATERSHEDS 3 & 4 OUTLET

Inflow Area = 160.138 ac, 0.68% Impervious, Inflow Depth = 5.78" for 100-YEAR event

Inflow = 233.13 cfs @ 8.04 hrs, Volume= 77.140 af

Primary = 233.13 cfs @ 8.04 hrs, Volume= 77.140 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs



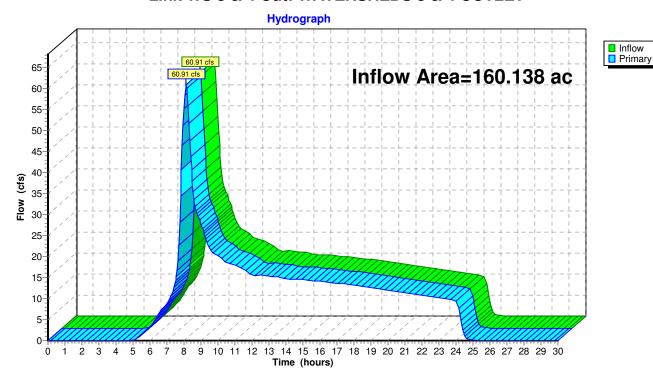
# Summary for Link WS 3 & 4 Out: WATERSHEDS 3 & 4 OUTLET

Inflow Area = 160.138 ac, 0.67% Impervious, Inflow Depth = 1.78" for 2-YEAR event

Inflow = 60.91 cfs @ 8.14 hrs, Volume= 23.797 af

Primary = 60.91 cfs @ 8.14 hrs, Volume= 23.797 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs



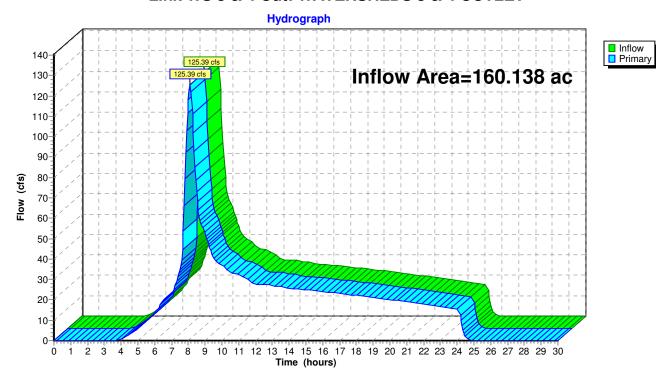
# Summary for Link WS 3 & 4 Out: WATERSHEDS 3 & 4 OUTLET

Inflow Area = 160.138 ac, 0.67% Impervious, Inflow Depth = 3.34" for 10-YEAR event

Inflow = 125.39 cfs @ 8.11 hrs, Volume= 44.528 af

Primary = 125.39 cfs @ 8.11 hrs, Volume= 44.528 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs



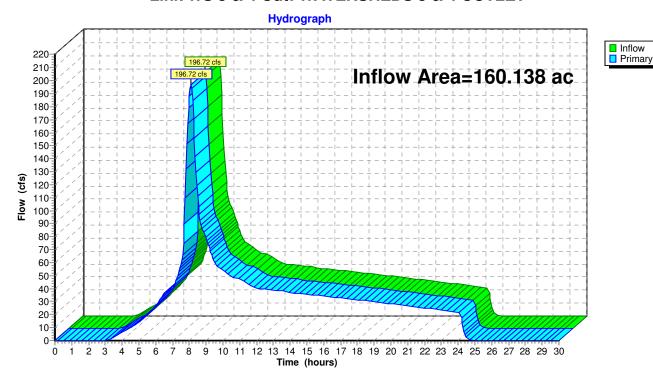
# Summary for Link WS 3 & 4 Out: WATERSHEDS 3 & 4 OUTLET

Inflow Area = 160.138 ac, 0.67% Impervious, Inflow Depth = 5.04" for 50-YEAR event

Inflow = 196.72 cfs @ 8.10 hrs, Volume= 67.284 af

Primary = 196.72 cfs @ 8.10 hrs, Volume= 67.284 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs



# Summary for Link WS 3 & 4 Out: WATERSHEDS 3 & 4 OUTLET

Inflow Area = 160.138 ac, 0.67% Impervious, Inflow Depth = 5.78" for 100-YEAR event

Inflow = 227.50 cfs @ 8.09 hrs, Volume= 77.140 af

Primary = 227.50 cfs @ 8.09 hrs, Volume= 77.140 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

